Practical Research on Project-based Experimental Teaching Reform based on OBE Teaching Concept

-- Python Experiment as an Example

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Abstract

With the development of information technology and the continuous innovation of computer technology, all walks of life in society rely more and more on information technology and at the same time put forward higher requirements for information technology. The country attaches more and more importance to higher education which rapidly cultivates computer talents, and the students cultivated by traditional higher education cannot meet the job requirements in the society, so we urgently try to reform the higher Python experiment teaching. The introduction of relevant policies has pointed out the direction for higher computer reform. In the executive meeting of the State Council hosted by Premier Li Keqiang, it was pointed out that running higher education with the idea of reform is of great significance to enhance the employment and entrepreneurial ability, industrial quality and comprehensive national strength of the labor force. However, due to the influence of backward traditional education methods, the following problems exist in China's higher education institutions when programming courses, such as Python, are offered in management majors, such as marketing majors: low motivation of students, imbalance between theoretical knowledge and practical skills, lack of team consciousness and innovation ability in the learning process, and a gap between graduates' abilities and employers' needs. Based on the many problems in Python experimental teaching, this study is conducted with the support of Taylor's educational goal theory, Bloom's mastery learning theory and Dewey's do-it-yourself theory with the help of the successful experience of OBE concept in other disciplines. The research process mainly adopts literature method, questionnaire survey method and interview method. Firstly, we analyze the current situation of higher computer teaching and the reasons for the problems in higher computer teaching; then we carry out theoretical and practical reforms for higher computer majors, and study the effective countermeasures of integrating Project-based teaching into computer majors based on OBE concept, and on this basis, we carry out the design of Project-based teaching based on OBE education concept; Project-based teaching based on OBE teaching concept The Project-based teaching based on the OBE concept is conducive to enhancing students' self-confidence, improving their learning motivation, practical ability and interpersonal skills, and thus improving their overall quality; it can make the balanced development of theoretical knowledge and practical ability, and finally realize the "unity of learning and application", and promote the double-win situation of school teaching and students' future employment. Therefore, the Project-based teaching reform of higher Python experiments based on OBE teaching concept meets the development needs of schools and society.

Keywords

Higher Education; OBE; Project-based Teaching; Teaching Reform.

1. Research Background

With the advent of the "Internet+" era, the use of computers in our work and life has become more and more widespread, and the ability of information technology has become a basic skill for people, and the number of people who pay attention to computer education is increasing. In addition, with the rapid development of science and technology, all industries need a large number of computer talents, and the society is in a shortage of computer talents, so the country has invested a lot of human and material resources to support computer education, and computer education is valued by schools and society. As learners in the new era, we have to seize the opportunity to continuously improve our information literacy.

Computer science majors in our higher education institutions are an important way to deliver various computer talents to the society. Due to the shortage of computer talents, colleges and universities are continuously adding various computer majors, hoping to train and deliver more talented computer talents to the society. As we all know, higher education institutions lack better educational resources like universities or colleges on one hand, and they do not have the same excellent student source as ordinary high schools, plus the fact that higher education institutions are expanding their enrollment in recent years due to the needs of the country, which leads to the shortage of educational resources and the decreasing quality of student sources. At present, the training of computer professionals in higher education institutions is mainly based on the basic concepts of the discipline, while the core curriculum given by the education department is referred to develop the curriculum system of the school, and the training objectives highlight the knowledge rather than the ability needed in the society. In the selection of teaching contents, most of them refer to the teaching materials that have been used by the school for simple knowledge transfer. The whole teaching process usually emphasizes theory over practice, test results over the learning process in the final assessment, and individual ability over teamwork in the cultivation of student quality, resulting in poor motivation, one-sided pursuit of final grades, lack of practical problem-solving skills and teamwork and communication skills, which ultimately leads to the cultivation of students whose overall ability cannot meet the needs of society. This ultimately leads to the cultivation of students whose comprehensive ability cannot meet the needs of society. Under the increasingly severe employment pressure, how to carry out higher education smoothly and cultivate talents that meet the needs of the society is an urgent problem for higher education institutions to solve nowadays.

2. Analysis of the Feasibility of Introducing OBE Teaching Concept into Computer Science Majors

(1) It has a great match with the computer science major. The OBE concept emphasizes the product output-oriented, student-centered organization and implementation of the teaching process, so that students can really learn knowledge and obtain research results in the process of hands-on practice, and at the same time help students improve their interest in learning and enhance the sense of learning acquisition. Computer science is a course that values practice and needs a teaching philosophy that supports practice, and the OBE teaching philosophy is consistent with the teaching needs of computer science majors. Under the guidance of OBE concept, students can acquire some practical skills that match their future employment and improve the transferability of their knowledge.

(2) There is rich reference experience The successful application of OBE concept in other majors provides practical reference experience for the citation of computer science majors. Nowadays, there are more and more engineering majors citing OBE teaching concept, and rich research results have been achieved. These successful cases and teaching experiences provide a good demonstration and reference for the application of OBE concept in the teaching of computer science majors, which greatly improves the effectiveness of integrating OBE concept into computer science teaching.

3. Purpose and Significance of the Study

3.1. Purpose of the Study

Through participating in the exchange training of teachers in higher education institutions and referring to the previous teaching practice experience and related literature, we found the following problems in computer teaching in higher education institutions: firstly, the higher Python experiment setting is relatively lagging behind the rapidly developing information society; secondly, most students in higher education institutions are students who failed in the secondary school entrance examination and did not get into the ideal high school, they lack solid cultural foundation and good They lack solid cultural foundation and good study habits, and have some boredom with the traditional classroom teaching mode; thirdly, some higher education institutions still adopt the traditional assessment method, which leads to the unbalanced development of students' theoretical knowledge and practical ability. This study adopts the research methods of literature research method, questionnaire survey method and interview method to study the current situation of teaching and reform needs, and then investigate how to carry out the reform of higher Python experimental Project-based teaching based on OBE teaching concept.

3.2. Research Significance

(1) Theoretical significance

The OBE concept emphasizes the product output orientation, focuses on the conversion of students' learning outcomes, and allows students to obtain the stage results of knowledge learning and research through hands-on practice, so as to enhance students' sense of learning acquisition. Project-based teaching can solve the problem of imbalance between knowledge education and ability cultivation, allowing students to learn knowledge in an active and practical way. The author is a teacher in a higher education institution, where Python experiments are currently taught by teachers and passively accepted by students. Such teaching is not conducive to the overall development of higher education students and is not in line with the concept of quality education. The integration of product output-oriented OBE teaching concept and Project-based teaching mode into computer teaching can effectively solve the situation of insufficient practical teaching in traditional teaching, change the role of teachers in traditional teaching, and highlight the main position of students. It provides a reference for more education fields to apply Project-based teaching based on OBE concept; it broadens the implementation ideas of teaching reform in the process of learning and applying OBE concept to assist curriculum implementation; the implementation of Project-based teaching based on OBE concept enriches and refines the teaching objectives and teaching contents of secondary institutions of higher education.

(2) Practical significance

First of all, it improves the learning motivation of higher education students. With the rapid development of China's economy, as far as the actual situation is concerned, there is a huge gap of higher education in China, and many industries lack a large number of skilled workers. However, people's consciousness is still stuck in the era of "only college is a good way out", so

the general high school that can eventually go to college becomes the object of people's competition, while the higher education institutions aiming at employment are rarely asked for. In the end, higher education became the choice of some students who did not successfully enter general high school but still want to finish their education, resulting in the quality of students from higher education institutions declining year by year, and the foundation of students is relatively weak. The quality of students is mixed, and their cultural foundation is weak. They generally have the disadvantages of insufficient motivation, poor study habits, low self-control, low learning efficiency and poor comprehension; however, these students are good at observation and hands-on, easily accept new things and like to participate in various practical activities. For these students, the teachers' persistent indoctrination in class can only cause students' aversion to learning, so that students with poor learning attitudes can only talk, play, play cell phones, play poker in class, and in time students will become difficult students, and eventually the vicious circle of classroom teaching effect.

Therefore, there is an urgent need to introduce new concepts and methods to promote teaching reform in higher computer classes. Using the OBE concept in the teaching of computer science can enable students to learn and consolidate new knowledge and improve their comprehensive knowledge application ability through rich practical activities with the help of Project-based teaching. Based on the Project-based teaching of computer science under OBE concept, students need to learn, apply and analyze their professional knowledge according to the actual development projects. In this platform, students can freely exert themselves, cooperate in teams, discover their shortcomings and improve and consolidate their knowledge structure through the practical exercise of development projects. In the process of practice, students can learn by doing and become the real subject of learning with more initiative and creativity. Secondly, to improve the adaptability of higher education students, there is a gap between the ability of students cultivated by traditional teaching and the practical skills required by enterprises, the content of the curriculum lags behind the development of the times, and the teaching methods cannot improve students' thinking ability and practical ability.

The Project-based teaching based on OBE concept borrows some real development and design cases for students to do a good research on the relevant theoretical knowledge, so that students can study the actual development projects and clarify the main work content in the development process, so as to clarify the important direction of future work. In the process of project participation, students can better recognize their own shortcomings, so that they know where they can make up for them and continuously improve their knowledge system. Project-based teaching based on OBE concept needs to determine the teaching content according to the knowledge, technical ability and quality requirements needed to complete the tasks of higher positions, so that students can be clear about what they should learn and do before they work, so that they can develop continuously. It makes students continuously enhance their practical and hands-on ability in teaching and ensures that they can better apply their knowledge in their future positions, which has a significant effect on enhancing students' job adaptability and improving their employment competitiveness. Concept definition and theoretical foundation This chapter defines the concepts of OBE concept, Project-based teaching and secondary higher education according to the research problem, and guides the whole research process with the four major theories as the relevant theoretical foundation, which provides strong theoretical support for the exploration of Project-based teaching based on OBE education concept.

4. Definition of Related Concepts

4.1. OBE (Outcome-basedEducation) Concept

The OBE concept, also known as "Outcome-based" concept or "Result-oriented" concept, is an emerging educational concept that takes learning outcomes as the starting point and designs

the teaching process in the reverse direction, ultimately breaking the traditional "teacher-centered, textbook-centered, knowledge-centered" teaching design. In the end, it breaks the traditional "teacher-centered, textbook-centered, knowledge-centered" teaching design, and advocates students' "independent learning, cooperative learning, and inquiry learning". In other words, the starting point of the curriculum model of outcome-oriented education is "learning outcomes", and it is no longer what students must "learn". Teaching and learning activities focus on what students can master and do after learning, which can stimulate students' interest in learning and improve the efficiency of teaching and learning activities. This study focuses on using the theory of "Outcome Orientation" to reform the teaching mode of higher computer science majors, setting clear and measurable educational objectives based on outcomes, making the whole process of education more focused on cultivating students' practical computer skills through learning, cultivating skilled talents that meet the needs of society, and judging the achievement of outcomes by the final learning results. The achievement of the results is judged by the final learning outcomes.

4.2. Project-based Teaching

Project-based teaching, also known as project teaching method, is a teaching method based on Project-basedlearning, for which there is no internationally accepted definition yet. This teaching model is aimed at producing and developing works, allowing students to practice in real project situations, stimulating their interest in learning, and allowing them to acquire relevant knowledge through independent learning in real problem-solving situations. To sum up, the Project-based teaching in this study is experience-centered and activity-centered, the teacher is transformed from a transmitter to a guide, and the students become the center of the whole activity, and the real project is used as the basis to cultivate students' practical ability, so that students' ability can finally achieve the expected learning effect.

4.3. Theoretical Foundations

(1) Taylor's educational objectives In 1950, Taylor, a famous American educationalist, published his classic book "The Fundamentals of Curriculum and Instruction". Most scholars believe that the publication of this book marked the formal formation of the "goal model" of curriculum development and became the dominant paradigm of curriculum development method. In his book, Taylor identifies four steps that curriculum experts should follow when developing curriculum: What educational goals should schools set? What learning experiences are more likely to meet these goals? How can we improve the effectiveness of organizing these learning experiences? How do we determine that these goals have been achieved? Once the final educational goals are determined, appropriate educational methods are selected to achieve the set goals, and finally, the achievement of the goals is evaluated. The guidance of the OBE concept is to emphasize that the Project-based teaching based on the OBE concept is based on the "expected learning outcomes" to drive the course content, teaching methods and teaching tools, and is divided into the following four steps: determining the expected learning outcomes, selecting appropriate projects or contents, organizing the projects or contents, testing the basic knowledge, and testing the effectiveness of the learning outcomes. (2) Bloom's mastery learning theory

(2) Bloom's mastery learning theory

At the end of the 20th century, Benjamin Bloom put forward Bloom's mastery learning theory. This theory advocates the effective combination of group teaching and individual teaching, and cares for the development of each student so that the students can rely on the knowledge and skills they have to develop in society. Its main idea is that intelligence is not the reason why students fail to do well, but mainly because they do not find the teaching help and learning materials that meet their needs. Therefore, the teacher's task in the teaching process is to create the right teaching environment for students with a full understanding and knowledge of their

actual learning to maximize the potential of each student. As shown in Figure 2.4 eventually six levels of educational objectives are reached from low to high: memorization, comprehension, application, analysis, evaluation, and creativity. [23] The core ideas of Bloom's mastery learning theory provide important supporting assumptions for the OBE model, broaden the ideas of OBE applied to Python experimental teaching, develop various teaching resources in depth, create a suitable teaching environment for Python experimental learning, and diversify teaching evaluation to judge the learning effect of students, put the expected learning outcomes according to Bloom's six educational goals classification, the expected learning outcomes are different in the face of different teaching tasks, and the required degree of mastery is not the same.

(3) Dewey's "learning by doing" theory

Dewey, an American educational thinker, put forward the "learning by doing" method of learning, believing that individual experience and growth can only be enhanced through practice, and emphasizing the unity of knowledge and action between "doing" and "learning". It emphasizes the unity of knowledge and action between "doing" and "learning. The "learning by doing" approach is in line with the objective laws of human understanding and links the learning of book knowledge with real-life activities, fully embodying the combination of learning and doing, and the unity of knowledge and action. Learning by doing enables students to acquire and master knowledge and accumulate direct learning experience in the process of doing, so that learners can learn knowledge more effectively. Based on the OBE teaching concept, the whole teaching process is carried out in a specific teaching environment, and the teaching activities are carried out through project practice, focusing on real-life situations, allowing students to gain meaningful learning experiences through independent exploration and active thinking, and cultivating skilled talents who meet the needs of society. The theory of "learning by doing" provides the theoretical support for the Project-based teaching reform based on OBE concept.

(4) Constructivist Learning Theory

According to Piaget, a Swiss scholar, constructivism is a learning theory about cognitive structure. Constructivism believes that knowledge is the result of the learner's own understanding and knowledge practice through the accumulation of existing knowledge and experience, with the help of others or other tools to build up meaningful learning. Constructivism opposes the traditional indoctrination style of teaching and emphasizes that learners are not passive receivers of knowledge, but active constructors of meaning. Learning is a process in which learners construct knowledge through existing knowledge to new knowledge, while harvesting meaning through sifting, processing, and experiential acquisition of external information with the help of others. Project-based teaching based on the OBE education concept emphasizes that students are the main body of learning and teachers are the guides. In the Project-based learning process, students advocate independent learning and collaborative learning in groups, actively construct knowledge and solve their own difficulties, and complete the improvement of knowledge and ability with the help of teachers. The Project-based teaching design of higher Python experiments based on OBE teaching concept is based on the OBE teaching concept of learning outcome output, which requires educators to clarify the final effect of students after learning in school, and then reverse design the whole teaching according to the final learning outcome. At present, most of the higher Python experiments are still in the traditional way of teachers teaching students to learn, coupled with the poor quality of the students themselves and their lack of interest in the traditional classroom, which has led to a vicious circle of teaching effects and the urgent need for new teaching methods to change the current state of teaching. The teaching center of the course is shifted from "teacher-teaching-oriented" to "student-learning-oriented", and the teaching objectives are centered on learning outcomes, and students' motivation is promoted through the process of achieving

learning outcomes. Project-based teaching based on the OBE concept provides a suitable teaching model for current students with clear objectives.5 Project-based teaching reform based on the OBE concept.

How to cultivate high quality higher education talents with strong practical skills so that graduates can successfully adapt to their future jobs? OBE is a student-oriented education concept that emphasizes cultivating students' practical skills, and higher education urgently needs to cultivate talents with strong practical skills, so OBE concept is suitable for higher education. Based on the OBE concept, Project-based teaching is an effective way to achieve the goal of OBE, which is to combine the requirements of higher competency development with "student-oriented" teaching reform and innovation to truly improve The curriculum under the OBE education concept, combined with the requirements of higher competence cultivation, carries out "student-oriented" teaching reform and innovation to truly improve students' higher education and professional skills.

4.4. Theoretical Teaching Reform

Although the traditional teaching mode has a relatively perfect theoretical system, the lack of connection with practice leads to the uneven development of students' practical ability, which leads to the lack of practical ability needed by enterprises. Therefore, under the premise of clear objectives, the Project-based teaching mode under the OBE concept is applied to the computer teaching courses, and the Project-based learning mode is used to strengthen the learning of theoretical courses. In the process of Project-based teaching, appropriate projects are selected for teaching, and theoretical knowledge points are integrated into the projects. Teachers should change the teaching-centered teaching method to a learning-centered teaching method. In the process of explaining the project case, the teacher draws out the problem through the project and lets the students find their own solutions to the problem. The teacher no longer plays the role of a mere lecturer but becomes a helper, a collaborator and a guide to lead the students to solve the problem, so that the students can personally participate and take the initiative to practice the way to solve the problems in learning. This can stimulate students' interest in learning and thus improve their learning efficiency in the boring theory class.

4.5. Practical Teaching Reform

Practical teaching occupies an important position in Python experiments, but traditional computer teaching is often practicing a few fixed and monotonous experimental projects in books. These projects are only a consolidation practice for the knowledge in books, and cannot exercise students' innovation and practical ability. Based on the OBE concept, we select projects that can help students achieve the desired learning outcomes and maximize their learning potential. Increase the opportunities for practical practice in and out of class projects. Only by doing more hands-on work can students identify problems and solve them, thus truly mastering what they have learned. In the whole practice process, teachers take the role of a guide, use the OBE outcome goal concept, take the set goals as the premise, adopt multi-level teaching, coordinate all the experimental contents, allocate the teaching practice according to the basic level - comprehensive level - innovative level - project level to reasonably allocate the experimental class time, and leave enough space for students to think and practice. Help students to complete the practice successfully and guide them to solve their own problems actively and independently. Encourage students to join various computer interest groups in school, participate in skills competitions on and off campus as well as participate in student practices in school-enterprise cooperation to further improve their practical skills.

5. Effective Countermeasures for Integrating Project-based Teaching into Computer Science Teaching based on OBE Concept

(1) Strengthen curriculum research and produce practical projects By studying students' performance during Project-based teaching, we can summarize the focus of future attention in student training based on students' strengths and weaknesses. Discuss and exchange teaching projects of different modes in terms of OBE concept, course objectives and graduation requirements, and continuously innovate and improve teaching projects through meaningful teaching and research activities after class. In addition, in the whole teaching process, if there is no suitable real project, teachers can organize the relevant project materials, make their own project design and apply it as a teaching project.

(2) Change the ideology and build dual-teacher teachers to integrate OBE concept into the teaching of computer majors, teachers should change the old ideas, keep learning and mastering new ideas, and actively cooperate to apply OBE concept into the teaching of computer majors. Schools cannot cope with the need to really bring the OBE concept into their own classrooms to improve the quality of teaching and the ability of the students they train, as well as to help students really come into this teaching model. Schools should continue to improve the innovative teaching ability of teachers, improve their ability to apply real cases, and strengthen the classroom design and classroom management based on the OBE teaching concept. The school insists on the principle of "going out", which can not only enrich teachers' practical experience in engineering, but also improve teachers' teaching ability and improve their overall teaching level. The school I work in sends teachers to attend teacher training every year, but the number of places is limited, so many teachers have to wait in line for several years to get an opportunity. The school should increase the channels of training for teachers and increase the opportunities for teachers to go out as much as their ability allows. In addition let teachers participate in the actual production link of enterprises, increase the close contact between in-service teachers and enterprises, summarize through enterprise practice the ability that students always apply more in the future practical work, clarify the future teaching objectives and master more teaching resources.

6. Project-based Teaching Design based on OBE Education Concept

In the teaching activities based on OBE education concept, the teacher acts as a guide, and designs the whole teaching process reasonably according to the expected learning outcomes that students should achieve at the end, and guides students to accomplish their goals. The Project-based teaching process based on the OBE education concept includes the following aspects, setting up the expected learning outcomes layer, the learning outcomes design layer, the learning outcomes evaluation layer, the verification of the achievement of the outcomes layer and the assessment of the achievement of the expected learning outcomes.

6.1. Expected Learning Outcomes Layer

The main task of higher education institutions is to cultivate a group of skillful talents with strong practical ability for the society. The society pays more attention to the practical and hands-on ability, teamwork ability and innovation ability of the graduates in terms of the requirements for computer talents. According to the standards of higher education talents training, professional characteristics and social requirements, the expected learning outcomes of students after learning Python experiment are determined.

(1) Social demand analysis investigates the demand of the society in terms of computer talents' ability, and formulates the training objectives to meet the demand of the society. We can understand the social demand by searching data on the Internet, questionnaires and interviews with students who have graduated and enterprises.

(2) Learning Needs Analysis Learning needs are crucial in instructional design, which mainly refers to the gap between students' current abilities and the desired abilities. The design based on OBE concept emphasizes on analyzing the difference with the society so as to determine the training goal, so the needs analysis should pay attention to the gap between learners' current and society's required talents' ability and determine the training focus.

(3) Learner characteristics analysis Learners as the main participants of teaching activities, students' abilities in all aspects can influence the whole teaching process, so learner characteristics analysis is crucial. In this paper, three aspects of learners' initial ability, learners' general characteristics and learners' learning styles are selected for analysis.

(4) Teaching implementation environment Teaching implementation environment mainly depends on a school's teaching hardware, teaching software and teaching resources, and only by understanding these can we make a reasonable teaching design on this basis. In the process of teaching design, try not to make the teaching facilities wasteful and unused, and at the same time not to make the teaching design beyond the teaching is the environment, to make full use of the teaching resources, so that the teaching effect can be optimal.

(5) Expected learning outcomes and training goals According to the specific requirements derived from the analysis of social needs, learner needs, learner characteristics and the analysis of teaching implementation environment, combined with Bloom's teaching goal classification theory, the expected learning outcomes can be designed as specific, clear, measurable and implementable training goals at six levels, such as memory, understanding, application, analysis, evaluation and creation. The design of the objectives should conform to the following principles: i. Visualization and measurability can be borrowed from Bloom's classification of learning objectives. Second, the number of objectives should be moderate, too many or too few will not meet the requirements. Third, the objectives should be hierarchical from shallow to deep.

7. Conclusion

This paper has studied the background of the study, the purpose and significance of the research, and the current status of domestic and foreign research. Based on the research of finding relevant literature, the concepts and theories supporting this thesis are defined, and the problems and reasons in teaching higher computer science are summarized using questionnaire survey. Based on the analysis of the survey and interview results, a study of higher Python experimental Project-based teaching based on the OBE education concept was launched.

(1) This study explores the current situation of teaching computer in higher education and summarizes the reasons for the current problems from three aspects: schools, teachers and students, and finds that Project-based teaching based on OBE education concept is beneficial to solve the current problems in computer education.

(2) Through the research of higher Python experimental Project-based teaching based on OBE teaching concept, it was verified that the theoretical and practical teaching reform based on OBE concept can solve some current problems in computer teaching and improve classroom efficiency. Based on the reform, effective countermeasures for strengthening curriculum research, making practical projects and building dual-teacher teachers are proposed, which can make the OBE-based Project-based teaching reform in higher computing go smoothly.

(3) Project-based teaching based on the OBE teaching concept enables teachers to have a correct target orientation in teaching. According to the objectives of expected learning outcomes, teachers can better organize teaching activities and improve the efficiency and quality of classroom teaching. Project-based teaching based on the OBE concept can better mobilize learning interest, change learning attitude, increase learning motivation, and promote

the development of self-learning ability, practical ability, cooperative communication ability, innovation ability and higher ability.

8. Prospect

There are more theoretical researches on OBE teaching concept, but relatively few concrete practices. Therefore, the research features and innovations of the thesis are as follows: In the future, the author will further conduct a deeper research on this topic and try to make the selection of projects closer to life and to the needs of enterprises, so that students can integrate into the society in advance to meet the needs of society and enterprises through three years of study. The findings of this study will be applied by other teachers in the same group to verify the effectiveness of Project-based teaching based on OBE education in other computer science majors, and then be extended to other majors. Through more teachers joining and communicating with each other, we can broaden the ideas of Project-based teaching reform based on OBE education concept, and make Project-based teaching based on OBE education concept play a greater role in promoting the teaching of more courses.

Acknowledgments

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