Research on the Application of Blended Learning Mode Based on the OBE Philosophy --Taking "Artificial Intelligence-Graph Search Strategy" as an Example

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Abstract. With the rapid development of artificial intelligence (AI) technology, artificial intelligence education in secondary vocational schools has become imperative, however, at present, its educational philosophy and teaching methods are still in the exploration stage. What's more, there are some problems in the teaching process, such as the disconnection between teaching modes and students' characteristics, the low participation of students in class, the single evaluation way and the lack of ideological and political elements in class. Solving these problems requires secondary school vocational education researchers to explore educational philosophy and methods suitable for students majoring in artificial intelligence in vocational schools. This article selects "Graph search strategy" in artificial intelligence course as an example to establish a blended learning mode based on the philosophy of OBE, to help students clear the learning goals of students, stimulate students' interest in learning, enhance students' learning motivation.

Keywords: OBE education philosophy; blended learning mode; secondary education; artificial intelligence

1 Introduction

As China enters a new stage of development, industrial upgrading and economic restructuring is accelerating, the role of the vocational education is becoming more and more important. The newly revised Vocational Education Act of 2022 clarifies that "vocational education is a type of education that has the same importance as general education"[1]. In August 2022, the "Artificial Intelligence + Vocational Education Innovation and Development" forum discusses the new path, new mode, new initiatives for the development of vocational education in the era of artificial AI [2]. This indicates that China is paying more and more attention to the development of vocational education, especially the development of vocational education in the era of AI. AI as a strategic technology to lead the future, has been developing at an accelerating pace, while

Y. Kuang et al. (eds.), *Proceedings of the 2024 5th International Conference on Education, Knowledge and Information Management (ICEKIM 2024)*, Atlantis Highlights in Computer Sciences 22,
https://doi.org/10.2991/978-94-6463-502-7_95

at the same time, the shortage of talents has become more and more prominent. Secondary vocational schools are the cradle of cultivating applied technical talents and high-quality workers [3], it is particularly important for secondary vocational colleges and universities to offer the AI courses, however, the course is more theoretical and involves some methodology, technology, and application system[4], using the traditional methods can't meet the needs of teaching, therefore it is urgent for researchers to actively explore teaching methods suitable for students in secondary vocational schools.

2 Analysis of Teaching Problems

At present, there are some problems in the teaching process. First of all, teaching modes are disconnected with student characteristics. The ability of secondary vocational students to master basic knowledge is weak, the enthusiasm of secondary vocational students to learn theoretical knowledge is not high, the positive learning motivation of secondary vocational students is lack, and the learning objectives of secondary vocational students are not clear [5]. However, the "Cramming teaching mode" does not consider the characteristics of them; secondly, students' participation in class is low. In the current classroom teaching, students lack of cooperation, they are used to passive learning, class participation is low [6]; thirdly, the way of student evaluation is single. Most of the existing evaluation methods are based on the mid-term and end-term test results, with scores as indicators, and they lack the process of tracking the learning of students and the evaluation of students' professional quality [7]; finally, the teaching process is lack of ideological and political elements. There are formalism and purposeful problems in curriculum ideology and the content of ideological education is separated from the professional curriculum.

3 Application of OBE Education Philosophy to Course

3.1 Pedagogical Analysis

Learning Situational Analysis

This course is aimed at the students majoring inartificial intelligence in secondary vocational schools, who generally lack interest and patience for knowledge involving theories, but have active thinking, strong hands-on ability, and are willing to accept new things and new ideas.

Course Objectives

The objectives of the course "AI" are divided into three levels. First of all, students are required to understand the basic ideas of AI, master the basic theories of AI; secondly, students are required to design experiments for technical verification and analysis of the basic theories of AI; finally, students are required to pay attention to the new

developments and trends of field and interdisciplinarity, and update their knowledge to meet the needs of professional and social development.

Teaching Objectives

The teaching objectives are divided into three dimensions: knowledge, ability and emotion. In the knowledge dimension, students are required to understand the general process of graph search and master the width-first and width-first search methods; in the ability dimension, teaching objectives are cultivating students' logical thinking ability; in the emotion dimension, teaching objectives are improving students' interest in learning and cultivating students' rigorous and steady learning attitudes.

Teaching and Learning Difficulties

Based on the teaching objectives and the analysis of the learning situation, the teaching focus of this lesson is the width-first and depth-first search methods; the teaching difficulties are the characteristics and limitations of the blind search strategy.

3.2 Innovations in Teaching and Learning

The specific teaching innovations are reflected in the four aspects of course content, course activities, course evaluation and course ideology.

The teaching of the course adopts the blended learning mode, which is the learning mode of "Online+ Offline". Online learning includes two parts: "On-line before class" and "On-line after class"; when studying offline, students will as the main body to launch a series of teaching activities. The structure is shown in **Fig 1**.

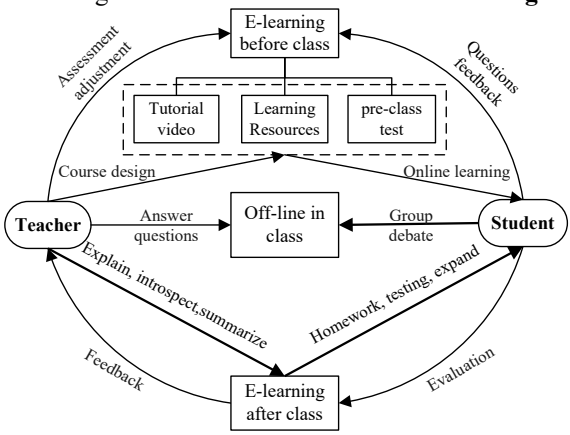

Fig. 1. Blended learning mode

The course content adopts the PBL teaching method to reflect the cutting-edge and contemporary nature. PBL case study is used to mobilize students' interest in learning;

students' motivation is induced through problem-driven learning [8]; the form of classroom debate is used to stimulate the students' critical thinking ability; collaborative group work on PBL assignments is used to drive students' learning ability.

The course evaluation adopts multi-dimensional formative evaluation to explore students' individual learning achievements. Besides students' self-evaluation, students' mutual evaluation and teachers' evaluation, there is also an online evaluation system, from the students' attendance rate, homework accuracy, and other aspects [9] to realize the summary, reflection, adjustment and innovation of teaching mode. The whole evaluation revolves around the blended learning mode, the objective indicators account for 60%, including task completion rate, pre-class test, pop quiz, homework and expand learning; the subjective indicators account for 40%, including teachers' evaluation, students' self-evaluation, students' mutual evaluation. These indications compose the results of the formative assessment. The details are shown in Table 1.

Table 1. The main indicators and detailed rules of formative assessment

objective indicators (60%)					subjective indicators (40%)		
Task completion rate (15%)	pre-class test (20%)	Pop quiz (25%)	Homework (30%)	Expand learning (10%)	teachers' evaluation (45%)	students' self-evaluation (30%)	students' mutual evaluation (25%)
Online					Offline		

The score is calculated according to the indicators given in Table 1. The higher the score, the better the learning effect of the students. Especially, at the end of the course, we will make a correlation analysis between these indicators and students' exam scores, the results will be used as the basis of adjusting the weights of these indicators to optimize and improve the evaluation system. The implementation flow is shown in **Fig 2.**

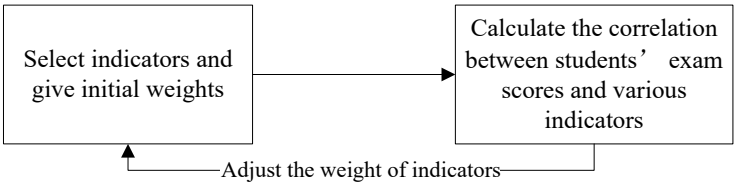

Fig. 2. Weight adjustment process

Civics of the course adopts multi-element penetration integration, such as the introduction of China Beidou and Huawei 5G in class to illustrate China's independent innovation; the intelligent transportation APP and the "Path search problem" in some Chinese cities are designed to inspire students' sense of China's road mission. The ultimate goal is to help students establish a correct outlook on the world, outlook on life and values.

3.3 Teaching Process

The teaching process is divided into three parts: before class, in class and after class. It is designed around the cultivation of students' autonomous learning ability. The structure is shown in **Fig 3**.

Before class, teacher releases the video series of "The road of Beidou satellite navigation growth" for students to watch and learn; besides, teacher opens learning task points, continuous attention to background data; then sets pre-class tests to grasp the students preview situation; finally, according to the students to adjust the teaching content and teaching methods.

In the class, teacher takes the navigation APP installed on the mobile phone, as well as Huawei 5G as the entry point, to conduct the new curriculum introduction; then takes the route search from Beijing to Yunnan as an example of PBL project to stimulate students' thinking and discussion. At the same time, teacher sets up a group debate to deepen students' mastery of knowledge, deeply implement the "Student-centered" and OBE philosophy; finally, teacher uses the Art of War adage "Those who are good at fighting, must seek what they can gain from the situation" to help students learn the wisdom of the Ancients and remind them what to learn in the next lesson.

After class, teacher releases the homework to know the students' mastery of the knowledge of this lesson, at the same time, releases the questionnaire to get the students' feedback on this lesson so as to improve the basis. Moreover, teacher arranges challenging exercises and PBL group work to cultivate students' sustainable learning ability.

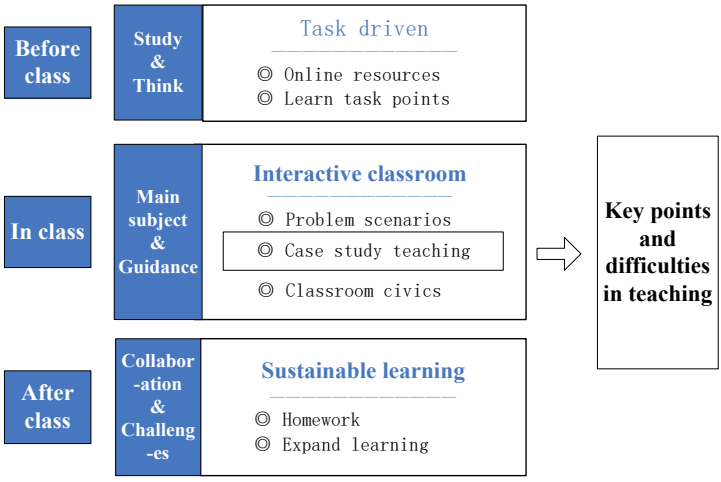

Fig. 3. Teaching process

The whole teaching process follows the OBE education philosophy, incorporates the Civic-Political elements of the curriculum, is student-centered, focuses on the content of the graph search course, and combines the dual intention of national sentiment, scientific and technological innovation to carry out the fundamental task of cultivating morality and nurturing human beings.

4 Conclusions

Compared with the traditional teaching mode and method, the blended learning mode based on the OBE philosophy can make the teaching and learning objectives of teachers and students clearer, it can stimulate students' interest and motivation in learning, improve the learning efficiency of the students, and it combines with the project examples to make the students' mastery of knowledge more solid. Integrating ideological and political elements into the teaching process, reflecting cultural heritage and cultural self-confidence, to achieve the synchronization of ideology and politics education and professional education, to practice the mission of teaching courses to educate people for the Party and the country [10]. Therefore, it is necessary to apply the blended learning mode based on the OBE philosophy in AI course of secondary vocational schools.

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