



Research on Multi-dimensional Bilingual Teaching Model of Computer Courses Supported by Artificial Intelligence

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Abstract. Aiming at the problems of the integration of computer course teaching with international teaching and engineering certification, this study designs a multi-dimensional teaching mode of computer courses through the support of Artificial Intelligence. It analyzes the teaching resources, learning services, teaching process and teaching means involved in computer course teaching. Taking the course of “Computer Introduction” as an example, this study explores the multi-dimensional bilingual teaching mode supported by Artificial Intelligence, trains computer talents who meet the ability requirements of the era of Artificial Intelligence, and provides ideas for the teaching innovation of other courses.

Keywords: Artificial Intelligence · Computer Courses · Multi dimensional · Bilingual Teaching Mode

1 Introduction

Artificial Intelligence (AI) technology is developing continuously. It promotes the reform of teaching methods, teaching tools and teaching environment, and provides new conditions and opportunities for the teaching of computer courses in Colleges and Universities. International talents are strategic resources for countries to improve their comprehensive national strength and international competitiveness. In the international talent competition, China's international talent training and development should adapt to the new situation and new needs of national economic and social opening to the outside world in the new era. This is in line with China's new role and orientation in the process of globalization. It is also “the Belt and Road” construction, which requires new challenges and talents for talents. In addition to professional knowledge and ability, the international talents needed by China should also have the ability to communicate professionally in foreign languages. According to the graduation requirements in the “general standard

for engineering education certification”, which includes “communication” ability, that is, “be able to effectively communicate and communicate with peers in the industry and the public on complex engineering problems, including writing reports and design manuscripts, making statements, clearly expressing or responding to instructions, and have a certain international vision and be able to communicate and communicate in a cross-cultural context”. This means that students can apply it to learning professional knowledge, solving the application of professional literature and cross-cultural communication with peers in the industry. With the support of artificial intelligence, implement diversified and three-dimensional bilingual teaching (Chinese and English) for computer series courses, so that students of this major can be familiar with the language norms of international professional communication, enhance their confidence in completing English tasks in professional fields, and also provide reference for bilingual teaching modes of other engineering majors in the school.

2 Related Research

2.1 Teaching Mode Under AI

As one of the most advanced technologies in the world, AI has brought new opportunities and challenges to the teaching of various courses in Colleges and Universities [1]. The traditional teacher centered classroom has deficiencies in the cultivation of students’ comprehensive quality. Students’ subjectivity is difficult to give full play, and it is difficult to cultivate college students who meet the requirements of the development of the times by simply reforming the teaching content [2]. Domestic teaching modes mainly include research-based teaching mode, task driven teaching mode, and teaching mode based on virtual simulation platform, micro class, Mu class, etc. The research-based teaching model strives to cultivate students’ innovative ability, but this model has high requirements for students’ learning foundation [3]. Based on the task driven teaching model, due to the uneven ability of students to complete tasks, the interaction between teaching and learning is also difficult to carry out effectively. The teaching mode based on virtual simulation platform, SPOC and MOOC has deficiencies in personalized teaching needs [4]. In the teaching of computer course, some well-known universities abroad provide students with corresponding reading documents for different teaching contents, conduct in-depth discussion on some classical knowledge points, and add cutting-edge research contents in classroom teaching, so as to increase the breadth and depth of course teaching. We need to cultivate students’ practical ability through comprehensive homework [5]. With the development of AI, some foreign schools have explored the intelligent presentation of teaching content in the teaching of computer courses, but the development is not mature enough.

2.2 Application of AI in Bilingual Teaching

With the development of educational informatization, AI technology has had a revolutionary impact on bilingual teaching. The theoretical research and practical achievements of bilingual teaching informatization are increasingly enriched, which has brought bilingual education to a new level [6]. However, at the same time, the in-depth application,

integration and innovation of AI technology are not enough, which is mainly reflected in the lack of relevant teaching resources, insufficient international academic exchanges and cooperative research, backward information infrastructure and insufficient teachers' information-based teaching ability [7]. Due to the limited time and energy, teachers mostly imitate the traditional teaching mode and directly apply the PPT template of relevant courses in the teaching process. The application of multimedia resources and tools is only limited to the shallow level. The function and function of AI technology can't be well displayed, and intelligent teaching can't be widely carried out and implemented [8]. The traditional evaluation method can't improve students' learning level. Based on the above situation, taking the ability in the era of AI as the goal, it is a beneficial exploration to carry out multi-dimensional bilingual teaching supported by AI.

3 Construction of Multi-dimensional Teaching Mode of Computer Courses Supported by AI

3.1 Three Dimensional Construction of Teaching Resources

Online Resource Allocation

Online resources are allocated with the help of corresponding platforms, such as network assisted teaching platform, research-based teaching platform, high-quality course construction platform, etc. In the era of big data, the acquisition of teaching resources has long gone beyond national boundaries. For bilingual teaching, it is particularly necessary to select foreign excellent teaching platforms.

Offline Resource Allocation

Computer courses are highly practical, and corresponding experimental practice bases are needed offline. The off campus practice base can be companies, etc., and the experimental sites in the school are generally configured by the school. In addition, the original English version of the teaching materials used can more accurately express professional terms.

Online and Offline Resource Recommendation Service Supported by AI

We can conduct multi-dimensional analysis through AI technology to master the dynamic results of students' habit of using resources, learning track, learning level and learning effect. To solve the problem, we can use the real-time translation provided by foreign electronic resources to recommend appropriate online and offline resources. In this way, the intelligent and personalized content push of the platform can be realized.

3.2 Construction of Three-Dimensional Teaching Service

Teachers Answer Questions Online and Offline

By collecting and understanding the information of each student, we can carry out online Q & A in order to better interact with students and provide personalized services. When

answering questions, we need to analyze the reasons for students' questions, record and summarize them, and give students inspiration and encouragement in learning. Face to face Q & A needs to set themes around the teaching content to enhance the purpose of teaching services.

Discussion and Mutual Assistance among Students

Students discuss and help each other through online Wechat groups and offline centralized counseling. Activities are limited in time and topics are communicated in foreign languages. In this way, the discussion content will be relatively concentrated, exercise oral English and learn more professional terms. Everyone is free to express their views. Through discussion, students can understand each other's strengths and weaknesses and put forward solutions at the same time.

Personalized Teaching Service with the Support of AI

There are differences in students' foreign language level, learning foundation, learning ability and learning preference. Different students have different needs for teaching services. Adopt AI technology to collect and analyze students' learning information, clarify which knowledge points students have mastered and which key and difficult points need to be broken through, and collect students' learning behavior information, so as to teach students according to their aptitude.

3.3 Construction of Three-Dimensional Teaching Process

Diversified Teaching Forms

To achieve the corresponding teaching objectives, teaching forms need to be diversified. In addition to the traditional teaching mode, it also needs to adopt the teaching form designed by teachers and students. Under the guidance of teachers, students independently design learning plans, and then teachers review and implement them. In the teaching process, students need to organize in a foreign language. Through diversified teaching forms, pay attention to fully reflect students' autonomy and effectively stimulate students' interest in foreign languages and professional knowledge. In this way, it can break through the key and difficult points of learning and effectively achieve the ability goal.

Diversified Evaluation Methods

Teaching evaluation is a very important link in teaching. Appropriate evaluation methods play a positive role in promoting teaching. Considering the reasonable setting of evaluation indicators to achieve diversified evaluation, we adopt a dynamic and static evaluation system. On the subject of evaluation, we give full play to the role of students as the main body. Students' self-evaluation and students' mutual evaluation can account for a certain proportion. Through diversified evaluation, let students find their own shortcomings and direction of efforts.

Teaching Process Optimization with the Support of AI

Due to the limited energy of teachers, some repetitive work in the teaching process can be completed by technical means, which needs to make full use of AI assisted teaching means to optimize the teaching process.

4 Artificial Intelligence Technology Helps the Realization of Multi-dimensional Teaching of Courses

4.1 Teaching Solution of Computer Courses by AI Empowerment

Selection of Teaching Resources

Having rich resources does not mean that the teaching objectives of the course can be achieved. We need to choose the right resources from the massive resources. For the bilingual teaching of computer course, we make some specific resources according to the characteristics of students. We analyzed the knowledge system, Chinese and English translation, key and difficult points of the course, what Chinese and English resources support each knowledge point, especially how to break through the difficult problems. Different teaching resources are needed for different ability goals. We need to solve the problem of hierarchical gradient of teaching resources.

Personalized Recommendation of Teaching Resources

We can recommend popular resources and make a ranking list of popular resources according to the frequency of resource use. At the same time, let students participate in the scoring of good and bad resources. After a period of scoring data collection, recommend the resources recognized by everyone. The recommendation methods of teaching resources should be evaluated and analyzed according to the recommendation results, continuously improved, integrated with a variety of methods, and provide a variety of learning programs for students.

Diversification of Teaching Methods

We promote students' interest in learning through diversified teaching forms. By inviting foreign teachers and experts with overseas study background into the classroom to interact with students and conduct special Q & A. Some teaching contents can be completed online through MOOC, breaking through the limitation of course hours and cultivating students' learning ability. Self-learning of traditional teaching materials will make learning boring, and some concepts are difficult to understand and master only by text introduction. We break through some difficulties through diversified teaching resources. For some teaching contents, the teaching form from theory to practice and then back to theory and practice is adopted.

Diversification of Teaching Evaluation

In addition to the traditional evaluation methods, students' use of resources and the degree of participation in curriculum interaction should be included in the evaluation system. Teachers should set evaluation parameters, automatically generate evaluation results by the platform, and construct a diversified evaluation system of computer curriculum through AI technology. Teachers need to actively solve the difficult problems in the evaluation process and treat every student fairly.

4.2 Teaching Realization of Computer Courses by AI Empowerment

This study selects “Computer Introduction” as an example course to carry out the teaching pilot. Firstly, three-dimensional allocation of teaching resources of the course, including online resource allocation, offline resource allocation and online and offline resource recommendation service supported by AI technology. Secondly, build three-dimensional teaching services, including teachers’ online and offline Q & A, students’ discussion and mutual assistance, and carry out personalized teaching services with the support of AI technology. Thirdly, realize the three-dimensional teaching process, including the diversification of teaching forms, the diversification of evaluation methods, and the optimization of teaching process with the support of AI technology. Finally, through the comparative analysis of the effect, improve the teaching resources and teaching methods (Fig. 1).

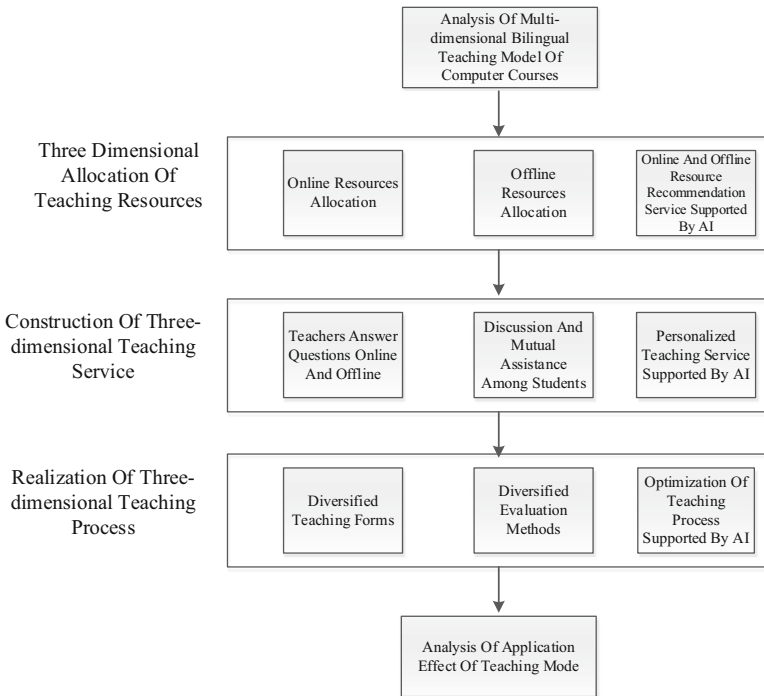


Fig. 1. Implementation Scheme of Multi-dimensional Bilingual Teaching of Computer Course Supported by AI

The specific implementation process is as follows:

Understand the relevant teaching software supported by AI, investigate the bilingual teaching mode of foreign language college, the available foreign teacher resources, and experts with overseas study background and industry background, so as to prepare for the construction of three-dimensional teaching space.

Taking the “Computer Introduction” as an example, select the appropriate teaching resources. First, select offline teaching materials and reference books. The teaching materials are in the original foreign language, with moderate difficulty and recognized by the industry. Then, for online reference resources, select forums and forums closely related to cutting-edge technologies such as big data, AI and Cyberspace Security, such as Ted, new technology release and other resources. Finally, guide students to enter foreign Coursera, EDX and other MOOC platforms to search the public teaching resources of international top universities such as Harvard and MIT, and carry out three-dimensional allocation of teaching resources.

Make full use of AI teaching software to provide students with online and offline Q & A. Establish a special discussion space, publish discussion topics regularly, discuss in English alternately, and solve problems with each other. At the same time, count the students’ speeches and mine meaningful and constructive speeches to provide reference for later evaluation. According to the difference of students’ individual knowledge level, AI technology is used to provide students with personalized learning services.

Diversified teaching forms are adopted. In addition to the conventional online and offline flipped classroom learning basic knowledge, for the new technology part of the teaching content, the teaching form jointly designed by teachers and students is adopted. Under the guidance of teachers, students independently design learning plans, and let students make presentations in thematic groups. Then teachers review and implement, and pay attention to fully reflect students’ autonomy and effectively stimulate students’ interest in learning. Let them break through the key and difficult points of learning and effectively achieve their ability goals. Invite foreign teachers into the classroom to practice oral English with students. For cutting-edge new technologies, invite experts with overseas learning background to give special lectures and interact with students.

Set reasonable evaluation indicators and adopt a process evaluation system. The evaluation of the basic knowledge part is carried out by the system, and the topics include Chinese and English. The operation part should pay attention to the use of re technology. In addition, it should also include daily oral evaluation, students’ discussion of the topic in the group, etc. On the subject of evaluation, students themselves should also be one of the subjects of evaluation. Students’ self-evaluation and students’ mutual evaluation account for a certain proportion. Through diversified evaluation, let students find their own shortcomings and direction of efforts.

This study implemented three-dimensional bilingual teaching for Freshmen (2020) in the course of “Computer Introduction”. Through the analysis of students’ interviews and performance evaluation results, the main results are shown in the following aspects:

Through diversified forms of teaching, students’ interest in English learning is stimulated.

Through online and offline resource allocation, the introduction of computer introduction course on foreign Coursera platform has brought a refreshing feeling and made the classroom more vivid and interesting.

The understanding of professional terms is increased through the original textbook. The translation in Chinese textbooks is sometimes obscure and difficult to understand. The understanding of professional knowledge is deepened through the original textbooks.

Through three-dimensional service, discussion and mutual assistance among students, students' oral expression ability is exercised.

Through the personalized recommendation of personalized intelligent software, students can better understand the latest cutting-edge technology in computer and consolidate the professional architecture.

5 Conclusion and Suggestion

Domestic colleges and universities are strengthening cooperation and exchanges with foreign colleges and universities. In the past two years, they have strongly supported teachers to study for doctoral degrees abroad, which provides an opportunity for bilingual teaching in this study. Computer courses are highly dependent on English, so bilingual teaching of computer courses can improve students' international competitiveness. This study takes the course "Computer Introduction" as an example to carry out teaching pilot, and explore the multi-dimensional bilingual teaching of computer course supported by AI. This paper studies the all-round overall design of the teaching content, teaching form, teaching platform, evaluation technology and analysis technology in the bilingual teaching of computer course, so as to create a multi-dimensional bilingual teaching mode of the course. It is of great significance to improve students' innovative and practical ability and adapt to the new needs of the future AI society for the ability of international talents.

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