

Teaching Design and practice of artificial Intelligence course in normal Colleges and Universities under the concept of STEM Education

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Abstract: With the development of big data, Internet of things, block chain and other technologies in recent years, China has issued the New Generation artificial Intelligence Development Plan, the Action Plan for artificial Intelligence Innovation in Colleges and Universities, and the Modernization of Education in China 2035. Artificial intelligence has gradually entered the field of education. Artificial intelligence teaching is a hot topic in the field of education at present. under the guidance of STEM educational concept and based on the learning requirements of artificial intelligence, the secondary teaching design and development of artificial intelligence course in normal colleges and universities are carried out in this paper.

1. Introduction

In March 2019, the Ministry of Education released the results of the filing and examination and approval of the undergraduate major of the General Institutions of Higher Education in 2018. The first batch of artificial intelligence professional construction qualification was obtained in 35 universities in China, and the construction qualification of the approved "robot engineering" in 101 colleges and universities was approved by the Ministry of Education. With the introduction of the robot and artificial intelligence technology into the field of education, many colleges and universities use the robot technology in the teaching and research of the robot course, hoping to promote the students' full development through the education of the robot and train the innovative talents.

2. Problems

It is found that the concept of STEM education has been used in robot education at home and abroad, and good teaching results have been achieved [1]. Robot education emphasizes multidisciplinary integration, and it is necessary to pay attention to the cultivation of interdisciplinary comprehensive ability of learners. However, the current research on robotics courses mainly stays in the field of basic education, and there are few studies in the field of higher education. This research is based on the characteristics of the artificial intelligence course in the normal colleges, and the teaching design and practice research of the robot experiment course.

3. Teaching Design and practice of Robot experiment course

This course is an elective course for undergraduate students majoring in education technology.

The robot experiment course of artificial intelligence includes five projects: expert system, Arduino,PVC,VEX IQ, Lego and creation particles. This experiment has been carried out 16 times for a total of 36 class hours. The research in this paper is mainly based on Lego project.

The subjects of this experiment are 2013 undergraduates majoring in educational technology, with a total of 45 students. Through the survey of the pre-test questionnaire, most students have not come into contact with robots before taking this course, and they show great interest and expectation in the study of robotics course.

4. Course teaching objectives

Through the study of this course, students can understand the basic principles of artificial intelligence, methods and the basic process and links of their application, master the basic methods and basic skills of educational research, and form research consciousness and method consciousness. Cultivate the ability to analyze and solve problems, and lay the foundation for educational and teaching research. The purpose of this course is to enable students to master the methods of technology and design, the basic methods of artificial intelligence, and to apply them to future teaching and practical work. The practical problems in the application of technology can be solved by the methods of technology and design and artificial intelligence. To set up this experimental course, first of all, it is mainly Let students understand the basic knowledge of robot and its technology, stimulate students' desire to learn robot; Secondly, most of the students graduated from normal colleges and universities are employed in front-line teacher posts, so they initially infiltrate the concept of STEAM into the robot curriculum, guide students to master new educational ideas, and can be competent for the future work. Make due contributions to the cultivation of talents.

Table 1 Curriculum syllabus

	Experimental subject		Experimental subject
Experiment one	Construction of expert system for Plant Classification-artificial Intelligence	Experiment nine	Steering trolley or flying chair in the air-cognitive system
Experiment two	Model making and tool use	Experiment ten	Robot programming-RobotC
Experiment three	PVCsimple bionic robot	Experiment eleven	Virtual simulation system and robot-RobotC
Experiment four	Creation particle independent creation	Experiment twelve	Railings and automatic doors or wind vehicles-automatic control
Experiment five	Arduino Adjustable traffic light	Experiment thirteen	Display of the achievements of general technical works
Experiment six	Gear walking - structure and design	Experiment fourteen	Getting Started with Single-Chip Computer
Experiment seven	Fast driving car	Experiment fifteen	Introduction to single Chip Microcomputer II (LCD characters)
Experiment eight	Challenge mission: Lego robots take the black line	Experiment sixteen	Integrated challenge task

5. Analysis of teaching environment

The teaching site of this study is carried out in the laboratory of the teaching teacher. Because of the limited experimental space and experimental equipment, students are required to carry personal notebook computers, which not only solves the problem of insufficient resources, but also facilitates students' after-class study. The software and equipment related to the experiment are provided or prepared by the assistant after class.

6. Project Design - Learning and Application of LEGO Robots

Lego EV3 robot is a kind of educational robot for primary and secondary education. Its educational, scientific and interesting aspects are difficult to reach by other robots. It involves science, engineering, technology, art and mathematics and so on. Lego EV3 contains special parts that can realize a variety of mechanical motion functions, a high precision structural kit, a variety of sensors with high sensitivity, and a powerful, programmable main controller. It can realize the infinite design of the user.

6.1 Teaching goals

Knowledge and skills: preliminary understanding of automobile structure, robot framework design, Lego prototype car structure; master the difference between large motor and medium motor, main controller "motor control" function, motor motion module; three robot turning modes.

Process and methods: according to the requirements of the project, students give full play to their imagination, cooperate with group members to complete the design of the basic car and make it move quickly; students understand the completion process of the project by personally designing, building, programming and debugging.

Emotional attitude and values: under the guidance of teachers to explore knowledge points, initially form the use of comprehensive knowledge to solve problems, through group cooperation, enhance students' team consciousness, cultivate students' communication and communication ability; Through the project display summary link, cultivate students' self-confidence.

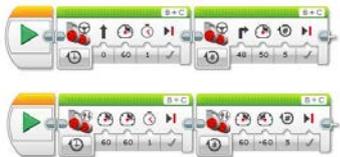
6.2 Teaching and teaching methods

The teaching activity is carried out by the project learning method, and the teaching focus is highlighted by the task driving method. The high-quality project includes the introduction of the basic components of the music, the introduction of the basic structure of the music (the gear set, the turbine system, the connecting rod structure, the differential structure), the introduction and application of the high-quality sensor (ultrasonic sensor, color sensor, touch sensor, gyroscope). The Lehigh EV3 basic procedure introduces a total of four sub-projects, with a total of six classes. The case analysis and extension task is set in each class, where the case analysis is the basic task, which requires each learner to understand and complete the case task through the teaching and guidance of the teacher and the teaching assistant, and the expansion task is to learn Practitioners complete higher-order tasks on the basis of basic tasks. In this process, the hierarchical teaching method is mainly used to guide learners to explore and practice independently, and to communicate with each other. In the whole teaching process, teachers play a role in teaching theoretical knowledge, helping students solve problems and guiding students to solve problems actively.

6.3 Teaching process

The course of the classroom teaching includes five aspects: the introduction of the subject, the explanation of the theoretical knowledge and the case analysis, the collaborative learning of the group, the successful demonstration, the exchange and sharing and the evaluation, among which the evaluation includes the teacher's evaluation and the student's mutual evaluation, and throughout the teaching process.

Table 2 Activities of teacher and students

teaching link	teacher's activities	Student activities	Note:100min
Experimental preparation	Prepare experimental equipment Share software installation packages Provide installation instructions Sharing learning kits	install software Preparation of pre-class learning materials Summary of difficulties and problems	Extracurricular completion
New course introduction	Introduction to Frontier Technology (AI AlphaGo; driverless) an example of daily life (running of a car, basic structure of a car)	Focus on inspire interest Follow the teacher to guide	5min learning situation
Theoretical learning	The Origin of Lego High-quality hardware: main control, large-scale motor, medium-sized motor, sensor, beam, shaft, shaft sleeve, connecting piece, connecting rod part, gear, wheel EV3 software: LEGO MINDSTORMS Education EV3 motion module, control module, sensor module, operation module Real-time interaction	Listen carefully Observation and recognition hardware Master the construction principle of the basic trolley Operation and familiarity with software Practical operation to respond positively to the teacher's interaction	40min The process includes the student's hands-on practice
case analysis	Case: fast driving of car Four components of the car: chassis, engine, body, control system Building: small foundation  Explain the program, real-time interaction 	Listen carefully Observe the structure of the basic trolley and think on how to innovate on the basic trolley The basic knowledge of learning and programming and the similarities and differences between different programming modules to respond positively to the teacher's interaction	15min
Group collaborative learning	Assignment of tasks "TROLLEY" "Follow the travel of the trolley" (expansion task) guide the active participation of the students Guidance and Help	Complete the task of "driving by car" Complete the expansion task according to the actual situation Reasonable division of work and cooperation in the group Record the process of thinking and making, including a series of engineering project processes, such as creative sources, construction, programming, adjustment, and so on	25min The process includes the exchange, sharing and evaluation of the groups
Work show	Guide the groups to show the finished work	According to the arrangement of the teacher, the results and processes of the completed process are displayed and explained in turn. To sum up the problem of learning	10min
exchange and sharing and evaluation	Review Answer questions and solve confusion	Mutual evaluation, communication and sharing	5min

6.4 Summary and reflection

As a routine course of robot teaching, the teaching process of Lego sub-project is carried out according to the teaching design. On the whole, the teaching activities are carried out smoothly, and the expected teaching objectives and teaching effects are achieved.

The advantages of the implementation of the teaching activity are based on the characteristics of the learner and the design teaching strategy; the teaching object is an undergraduate, the cognitive level is higher, the leading technology is cited in the introduction of the new class to attract the attention of the students, and then the problem level is reduced by using the actual problems in daily life. The purpose of this paper is to develop the engineering thinking consciousness of the student's high-house building and then to simulate and build through the existing resources. The second is the combination of the theory and the practice and at the same time; the theoretical explanation and the case analysis process are not the process of the whole process of the teacher's whole process, but the process of the instructor's explanation as the main student's practical operation. and finally, according to the actual teaching process, Adjust the rhythm and process of the class, for example, the student's introduction to the basic component of the music is relatively fast, while the introduction and application of the high-quality sensor is relatively slow, so it is necessary to make a reasonable adjustment.

The deficiency of teaching activities lies in the overestimation of college students' innovative ability. The knowledge foundation of the teaching content of Lego project is relatively rudimentary. It is hoped that students can make innovative improvements on the basis of cars, such as three-wheeled cars, four-wheeled cars, when arranging tasks. The gear linkage system is used to drive the chassis movement of the car, but the students adopt the structure of case teaching in the construction. The shortage of teacher prediction lies in the overestimation of college students' innovative ability, so teachers and teaching assistants should understand the cognitive level of learners from many angles before class in order to carry out reasonable teaching design.

7. Prospect

Robot education is in the ascendant in our country, and its healthy development is very important. Robot education in primary and secondary schools has become a "turbulence". It is hoped that more normal colleges and universities can carry out robot education in order to train more robot teachers, expand the teaching staff, and cultivate innovative consciousness for the future society. Innovative talents with innovative ability and innovative thinking. In the future, the visualization of knowledge will become more and more common in the classroom environment, and the roles of learners and teachers will also change.

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