

The Curriculum Construction of Computer Technology and Artificial Intelligence Foundation

1st Wu Yue

Beijing University of Posts and
Telecommunications Beijing, China
Beijing, China
zhxj20120219@163.com

2nd Liang Xuanyu

China University of Mining and
Technology-Beijing
Beijing, China
18239878436@163.com

3rd Cao Tianyu

China University of Mining and
Technology-Beijing
Beijing, China
poppincat@qq.com

4th Li Lin

China University of Mining and
Technology-Beijing
Beijing, China
1136461095@qq.com

5th Zhao Xuejun

China University of Mining and
Technology-Beijing
Beijing, China
zxjun@cumt.edu.cn

Abstract—In recent years, with computer science development and the rise of artificial intelligence, we truly perceive the information age's advent. Computers and artificial intelligence are constantly changing every aspect of human life. To improve young people's ability to apply new technologies, integrating artificial intelligence into basic undergraduate computer education courses is of great significance. In this paper, based on two years of educational practice in our school, we discuss the content of theoretical courses and practical courses on the fundamentals of computer technology and artificial intelligence and summarize some effective teaching methods. It improves the quality of teaching, paves the way for students' learning in subsequent courses, and contributes to the popularization of new technologies such as computer technology and artificial intelligence.

Keywords—Computer Technology, Artificial Intelligence, Undergraduate

I. INTRODUCTION

The information society is nowadays, and computer technology has developed rapidly and has been widely used. The information society and the wisdom era have put forward higher requirements for the cultivation of talents in colleges and universities and at the same time raised the standard and level of computer education in colleges and universities. The basic university computer course's characteristics and importance determine that it has always been the basic and main course in China's higher education institutions and is in the status of public basic course in colleges and universities, to which attention must be paid. Simultaneously, the rapid development of computers has also given rise to an emerging technical science - artificial intelligence, which is used to simulate and extend human intelligence theories, methods, technologies, and application systems, and has become a strategic technology leading the future.

Although nearly 100 colleges and universities in China have opened artificial intelligence majors or colleges, such as Tsinghua University, Peking University, University of Chinese Academy of Sciences, etc., for non-computer undergraduates, AI enlightenment education is not well done, and the following problems still exist:

1) Non-computer students do not pay attention to the learning of basic computer knowledge, and do not realize that The computer is now widely used in various fields and professions, and the development of many professions cannot be separated from computer, such as biomedical engineering, communication engineering, accounting, etc.

2) the content design of university basic computer courses is too monotonous and does not integrate new technologies, which cannot raise students' interest in learning.

3) the course content design is unreasonable, spanning a wide range of difficulties, which makes it difficult for students to absorb new knowledge.

Given the above problems, combined with the current actual situation of basic computer teaching in higher education institutions, this paper firstly discusses the teaching contents and teaching forms of the basic learning courses of computer technology and artificial intelligence to guide undergraduate students to master the basic computer operations and understand the basic knowledge of artificial intelligence. Secondly, in the experimental design course, the students' learning progress and theoretical knowledge are fully considered. The empirical contents are reasonably set, which improve the students' practical ability on the computer and improve the students' thinking and problem-solving ability. Finally, this paper summarizes some efficient teaching methods of computer subjects, technology is advancing, and basic education should also keep pace with the times.

II. THE INTEGRATION OF ARTIFICIAL INTELLIGENCE INTO BASIC COMPUTER EDUCATION IS A GENERAL TRENDSE

In 2017, the State Council issued "the New Generation Artificial Intelligence Development Plan," which put forward the concept of intelligent education, aiming to use smart technology to accelerate talent training mode and reform teaching methods. In 2018, the Ministry of Education issued the "Innovative Action Plan for Artificial Intelligence in Higher Education," which states: Facing the opportunities of the development of the new generation of artificial intelligence, universities should continue to promote the deep

integration of artificial intelligence in education and provide new ways for education reform. The international conference on artificial intelligence and education was held in 2019. The meeting proposed to promote the deep integration of Artificial Intelligence and education to explore new ways for teaching. Therefore, the integration of artificial intelligence into basic computer education is a great trend.

A. *the Fundamentals of Computer*

Computer Fundamentals is a basic course for non-computer majors in public colleges and universities, containing computer overview, computer systems, operating systems, multimedia technologies, software engineering, databases, computer networks, and other core computer knowledge. Proficiency in computer knowledge and in-depth computer technology application has become the basic skills for people to work in various social fields. A university computer foundation is a cultural education and quality education, and it is a technical skills education. Because of its characteristics, basic computer teaching can be quality education from two aspects: First, from the teaching content, starting from the introduction of the computer, let the students understand the history of computer development, and then from shallow to deep, in a hierarchical way to learn computer systems, operating systems, computer networks, and other theoretical knowledge, to improve students' understanding of computers comprehensively, leading them into "The second is the teaching method and mode, through the design and practice of the basic computer lab, students must learn how to use the Windows system, Office series Office software, basic network applications, etc., remember to use the learned computer theory knowledge and practical experience to solve general computer problems, improve the students' application ability.

B. *Artificial Intelligence*

Artificial Intelligence is a new technical science that studies develop theories, methods, techniques, and applied systems for simulating, extending, and expanding human intelligence. It is a branch of computer science that attempts to understand intelligence's essence and produce a new intelligent machine that can respond like human intelligence. Research in this field includes robotics, language recognition, image recognition, natural language processing, and expert systems. Artificial intelligence can simulate the human consciousness, the information process of thinking, and the development of artificial intelligence includes the period of conception, formation, application of knowledge, the period when the school of thought moves from discrete to integrated, and the period when the discipline of intelligent science and technology emerges. The three goals of artificial intelligence research are theoretical analysis of the adequate explanation of intelligent behavior, description of human intelligence, and construction of intelligent artifacts, which have penetrated all aspects of human society and gradually changed the way people learn, work, and live. Therefore, it is very necessary to open and learn courses on artificial intelligence.

III. THE CURRICULUM DESIGN OF COMPUTER TECHNOLOGY AND ARTIFICIAL INTELLIGENCE FOUNDATION

A. *Basic Ideas*

The curriculum design of computer technology and artificial intelligence foundation includes theoretical and practical courses, the academic course of computer technology and the foundation of artificial intelligence focuses on the introduction of the basic concepts of computer technology, basic principles, the theory of new computer technology, and the python language which is widely used today, which can further consolidate the basic theoretical knowledge of computer technology, broaden the horizon of computer technology of college students, and cultivate the ability of college students to use computer knowledge and technology to analyze and solve practical problems. Computer technology and artificial intelligence basic laboratory course is a strong, suitable course, mainly oriented to applying practice, students in mastering the basic concepts of computer and computer technology based on the basic theory to do more hands-on training. Through training to train students in the comprehensive quality of computer applications, students of various majors through the computer as a modern information-processing tool to solve the computer application problems in their respective fields of study to lay a good foundation.

B. *Experimental Course Design*

As shown in Table I, This course focuses on students' practical training in the application of computer technology so that students can master the basic concepts and basic theories based on hands-on practice on the computer.

C. *Theoretical Course Design*

As shown in Table II, Computer Technology and Artificial Intelligence Foundation course has 12 chapters, divided into two branches, the upper part of the content of the computer fundamentals and the lower part focuses on the foundation of artificial intelligence.

IV. TEACHING METHOD

A. *Case Teaching Method*

Computer science is a very practical discipline. The effect of a simple systematic lecture is often not good, and it needs the method of theory connection. The case teaching method is student-centered and attaches importance to the cultivation of students' practical ability, which is in line with computer science majors' teaching characteristics and teaching requirements. The case teaching method is based on students' mastery of basic knowledge and analysis techniques, under the teacher's spiritual planning and guidance, according to the teaching purpose and teaching content requirements, using typical cases, through students' independent thinking and cooperation, to further improve students' ability to analyze and solve practical problems.

And the implementation of case teaching in the computer professional class teaching is divided into two types of methods: 1 case lecture method is mainly used in the classroom teaching those cases with a strong application, give up the logic lecture and directly is the case lecture to teach,

primarily emphasizing the role of the teacher's explanation. For example, in chapter 12, "python programming fundamentals," the case study method emphasizes student participation, mainly to develop students' creative thinking and problem-solving skills, chapter 6 "database technology fundamentals," chapter 7 "software engineering fundamentals," etc.

B. Task-driven Method

The task-driven approach is a teaching method based on constructivist teaching theory. The principles of constructivist instructional design emphasize that students' learning activities must be combined with human tasks or problems, and the content of learning should be selected from authentic tasks, so as to mobilize students to explore problems to mobilize and maintain their learning interests and motivation, while teachers should propose prototypes of desired problem solving as tasks in the classroom to stimulate learners to form a conscious enthusiasm for research and discussion driven by such a typical "task. The instructor should present the prototype problem as a task in the classroom to stimulate the learners to form a conscious passion for research and discussion driven by such a typical "task". At the same time, as the instructor of learning, teachers should actively guide students to complete some "tasks" step by step from simple to complex, from easy to difficult. In the teaching activities to "task" as a driving mechanism can promote the formation of student motivation, cultivate students' interest in learning, and then improve the ability of students to learn actively. For example, at the end of Chapter 2: Word 2010 experimental chapter, the teacher proposed a task to design "my alma mater" word document because the task is easy for students to play independently, can immediately stimulate students' attention and interest, and then the teacher can be timely classroom feedback according to the completion of the task, optimize the classroom content.

C. project-based teaching

In computer practice teaching, teachers need to project-driven teaching to guide students to develop independently

topics, explain and explain key techniques and considerations in practice, inspire and guide students to think positively. However, according to the results of practical research, it was found that students still have problems such as laziness and plagiarism, especially in the more technical in practical courses, students' understanding and application of theoretical knowledge are relatively weak.

Therefore, computer teachers need to teach the application methods of big data technology to students, guide students to use big data technology in the process of practical learning extract, integrate, and summarize relevant theoretical knowledge and related technologies to improve practice teaching efficiency. For example, using big data technology to explore the development of similar projects development trends and the computer technologies involved, enabling students to explore through hands-on method, combining theoretical knowledge with practical process step by step. This method could make students develop an understanding of computer theoretical knowledge.

V. CONCLUSION

At present, artificial intelligence technology is in the rapid development stage, and universities at home and abroad are paying more attention to the basic education of artificial intelligence technology. Every major university has set up courses in this field. This plays an important role in cultivating students' thinking.

In this paper, according to the development status of artificial intelligence and the characteristics of basic computer disciplines, combined with teachers' years of educational experience, carefully designed the specific content of the construction of the basic course of computer technology and artificial intelligence, arranged in a reasonable order, focused, using a combination of theoretical and practical teaching methods, which is conducive to the gradual progress of students, gradually in-depth, after two years of education practice in our school, students can understand the traditional computer.

TABLE I. THEORETICAL COURSE DESIGN

<i>Title</i>	<i>Content</i>	<i>Objective</i>
Chapter 1: Windows 7	Familiar with Windows 7, file and folder operations, control panel, attachment-related operations	Mastering the operation of Windows 7, which is the basis for subsequent courses
Chapter 2: Word 2010	Document creation, Word2010 document layout, illustrations and tables, other operations in Word, Word mail merge	In this chapter, comprehensive content to "my alma mater" as the topic is in 1 page of A4 paper to create a Word document to practice word operations further.
Chapter 3: Excel 2010	This chapter introduces the basic operations of Excel: create documents, data entry, data manipulation, insert charts, formulas, insert pictures, clip art, etc.	Draw an Excel table independently with the "Statistical Report on Commodity Sales Records"
Chapter 4: Powerpoint 2010	This chapter mainly introduces the creation of presentations, slide show special effects settings and other operations	Create a content-rich presentation on the theme of "My hometown", using the techniques learned in class.
Chapter 5: Computer Network	This chapter mainly covers changing TCP/IP settings, basic Internet operations, web page creation	Students are required to learn to change TCP/IP settings and use Dreamweaver8 to create a personal website and design a personal homepage
Chapter 6: Python Basic Experiment	This chapter focuses on Python installation and use, Python language fundamentals, Python strings and process control, Python functions, other related structures of Python functions, Python object-oriented programming, Python modules and files, Python web crawlers and information extraction, and Python artificial intelligence practices.	Students are required to be able to determine leap years independently, print the ninety-nine multiplication table, count the number of letters, numbers and other spaces in a string, recursively find the Fibonacci sequence, complete a python web crawler program and predict the number of victims of the Titanic according to the lab guide.

Through the study of the course, students can master and apply the most basic methods of computational thinking, describe the steps and processes of solving problems for specific problems, and use the programming language they have mastered to run on the computer to obtain correct results. Students can also initially master the most basic concepts and methods of artificial intelligence, and apply them to the specific process of solving problems with computational thinking, laying a foundation for the application of artificial intelligence technology in future professional learning. Guided by issues related to artificial intelligence, it adapts to the development of new engineering and new liberal arts in combination with the needs of various majors, and promotes

students' ability to solve problems by integrating computational thinking with various majors.

The computer technology and artificial intelligence foundation course adopts the teaching method based on artificial intelligence cases, the case is the driving force, and the problem solving is the goal. In solving the case, the students' ability to solve complex problems is cultivated, so as to realize the organic combination of knowledge, ability and quality. Let students deeply understand that computational thinking is a thinking method for solving complex problems, and artificial intelligence is a method and tool for solving complex engineering problems.

TABLE II. THEORETICAL COURSE DESIGN

<i>Title</i>	<i>Content</i>	<i>Objective</i>
Chapter 1: Computer Overview	Preliminary introduction to computers' classification, the impact of computer technology on society, the history of computer development at home and abroad, and future development trends.	This chapter is intended to give students a general understanding and perceptions of computers.
Chapter 2: Information Representation and Coding in Computers	This chapter introduces the common number system and the conversion between the number systems, briefly explains the rules of binary operations and the representation and processing of numerical data, and outlines several ways of encoding computer information and the representation and processing of text in computers	Through this chapter's study, students will have a preliminary understanding of the information representation in the computer, the initial into the world of "0" and "1" in the computer, to lay the foundation for subsequent learning.
Chapter 3: Computer System Fundamentals	This chapter introduces the concepts, ideas, and functions of the system, the five major components of a computer with von Neumann architecture and the method of instruction execution, the components of a computer system, the features of a hardware system, the features of a software system and the internal structure of a mainframe computer through the origin of the idea of computer system - von*Neumann architecture.	This chapter introduces students to the components and working principles of computers from top to bottom so that readers can first have a rough understanding of computer systems as a whole and then gradually go deeper, making it easier to form the overall concept of computers.
Chapter 4: Computer Operating Systems	This chapter first introduces the concept, types, development history, and role of operating systems, then introduces the basic types of operating systems and each class's scope. Finally, it focuses on operating systems' functions: processor scheduling, storage management, device management, information management, and user interface.	This chapter goes deeper into the computer system. It aims to make students understand the importance of the operating system - the "nerve center" of the computer, the difference between processes, threads, and programs, focusing on the state of processes and the transformation between states, understanding the deadlock problem and the processor scheduling algorithm, page-segmented storage management.
Chapter 5: Multimedia Technology Overview	This chapter introduces the definition of multimedia, and the description of multimedia systems briefly describes the history and prospects of multimedia development, as well as common data types in multimedia systems, focusing on the software and hardware parts of multimedia systems, the role of multimedia hardware systems.	Students must learn and master the basic operation of some common multimedia software: Notepad, Microsoft office word, Photoshop, Adobe Premiere Pro, etc.
Chapter 6: Database Technology Fundamentals	This chapter introduces the concepts of database, database system, database management system, the interconnection between them, the four components that make up a database system, and the main functions of a database management system.	This chapter helps students understand the important role of databases, common data models and focuses on the basic concepts of relational databases, basic operations, and relational integrity constraints.
Chapter 7: Software Engineering Fundamentals	This chapter takes the software crisis as an introduction and briefly introduces software engineering using the software life cycle as a clue.	Students need to master the four classic lifecycle models in this chapter, the three types of models for requirements analysis and the three graphic tools corresponding to them, and the four types of maintenance activities in the software maintenance phase.
Chapter 8: Overview of Computer Networks and the Internet of Things	This chapter introduces computer network concepts, components, computer network architecture, local area network technology, introduction to the Internet, an overview of the Internet of Things (IoT), related technologies of the IoT, main application areas of the IoT, and development prospects.	This chapter will focus on mastering the network topology, IOS/RM interconnection reference model, TCP/IP architecture, and different levels of network interconnection devices, master IP address and domain name technology and understand the knowledge of the Internet of Things.
Chapter 9: Big Data and Cloud Computing	Big Data basic concepts, major technologies, cloud computing basic concepts, characteristics, types of services, and key technologies	This chapter provides students with a basic understanding of big data and cloud computing by explaining some of the basics of big data and cloud computing and laying the foundation for subsequent courses.
Chapter 10: Fundamentals of Artificial Intelligence	History of Artificial Intelligence, research objectives, research areas, and typical applications	Learn about the five periods of AI development and the three goals of AI research.
Chapter 11: Machine Learning	Machine learning is a multidisciplinary field, and this chapter focuses on classification algorithms and clustering algorithms	Recognize and understand the decision tree algorithm in classification algorithm and K-means algorithm in the clustering algorithm
Chapter 12: Fundamentals of python programming	This chapter starts from building the python language environment, explains the basic syntax of the python language, and combines several sample codes to explain the basics of python programming, and finally gives a web crawler case to enrich the class content.	Learn to master the basic syntax of python, complete the sample code of the book, and work hard to achieve the snake, web crawler, the Titanic shipwreck prediction model cases

After two years of education and training in our school, students can understand the basic knowledge of conventional and new computer technology, master the basic computer operations, and have certain computational thinking skills and information literacy in artificial intelligence, which can help the popularization of computer technology and new technologies such as artificial intelligence, and also pave the way for students to study subsequent courses to meet the needs of society for talent training.

REFERENCES

- [1] Zhao Tao. Research on the reform of computer basic teaching for non-computer students in colleges and universities [J]. *Wireless Internet Technology*,2020,17(23):154-155.
- [2] Zhou Xu. Thinking and practice of teaching reform of the course of "College Computer Fundamentals"[J]. *Education Teaching Forum*. 2019(36).
- [3] Wu Xiaoru, "Three influences and seven applications of artificial intelligence in the education industry", http://mt.sohu.com/it/d2017.0407/132548658_505811.shtml, 2017-5-30 271–350.
- [5] Huiyan Li, Hao Wang, Research on the Application of Artificial Intelligence in Education, University of Sanya, Hainan, China . 2020
- [6] Ma Lili,Song Wei,Li Wenjing Application of case teaching method in teaching computer foundation course[J]. *Curriculum Education Research*. 2018(08).
- [7] Tan Guiqin. The impact of the development of artificial intelligence on the training of computer professionals and analysis of countermeasures [J]. *Modern Vocational Education*,2021(05):128-129.