Innovation of Teaching Methods of Basic Computer Courses in Medical Schools Based on Artificial Intelligence

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ABSTRACT

Due to the rapid development of artificial intelligence, the introduction of computer courses in medical colleges has faced problems such as delayed content updates, single teaching methods, and weak practice links. These problems stem from the limitations of curriculum design, teaching philosophy and students' learning methods. Therefore, it is necessary to carry out teaching reform. They are updating course content, enriching teaching methods, optimizing teaching resources, improving teaching quality and cultivating compound medical talents. These innovative methods can provide a reference for teaching computer introduction courses in medical colleges.

Keywords: Artificial intelligence, Medical schools, Computer fundamentals, Teaching methods.

1. INTRODUCTION

With the rapid development of Artificial Intelligence Generated Content (AIGC) technologies at home and abroad, such as GPT-4, Wen Xin Yi Yan, and Doubao, human beings are accelerating towards the age of intelligence [1]. Artificial intelligence (AI) technology is increasingly integrated into all walks of life, driving rapid economic and social development. The development of various industries requires talents with digital skills, digital literacy and digital knowledge. Hence, cultivating digital talents is of great significance to the development of the economy and society.

As an introductory course for cultivating digital talents in medical schools, introductory computer courses are pivotal in talent cultivation. Moreover, most students have yet to receive systematic computer knowledge training before entering university courses, while many university courses require the application of basic computer knowledge. Therefore, basic computer Courses play a vital role in the talent training program of colleges and universities.

2. OVERVIEW OF ARTIFICIAL INTELLIGENCE

2.1 Definition of Artificial Intelligence

Artificial Intelligence (AI), or intellectual apparatus or machine intelligence, is a technology that manifests human intelligence through computer programs. The term was coined by the Dartmouth Institute in the 1950s. Artificial intelligence involves computer science and is closely related to several disciplines, such as information theory, cybernetics, bionics, psychology, linguistics and philosophy. These disciplines provide a solid theoretical foundation for the development of artificial intelligence [2].

Artificial intelligence technology has a dual character: humanized and intelligent. Its content is rich, diverse and challenging. By synthesizing knowledge from multiple disciplines, AI technology continues to advance, driving development and innovation in various fields.

2.2 Characteristics of Artificial Intelligence Technology

Artificial intelligence technology has distinctive features: (1) the ability to solve uncertainty problems: Artificial intelligence can effectively deal with problems with uncertainty factors. Many problems require complex calculations through computers and need a fixed framework. Artificial intelligence technology can quickly extract and present key content and data in ambiguous information. However, this requires network management to remain fluid and efficient. (2) Powerful learning ability: Artificial intelligence technology has a robust learning ability. Even some simple and low-level concepts and information often hide essential values in massive network information. Through AI technology, by simply inputting data, the system can automatically calculate and process the information, obtain high-precision data, and complete the calculation quickly, thus significantly improving the efficiency and quality of work. (3) Low Cost and Low Resource Consumption: AI computing is low cost and consumes fewer resources. In the calculation process, artificial intelligence mainly uses control algorithms, which are fast and efficient, thus saving many computing resources and promoting the operation speed of the computer.

3. THE CURRENT SITUATION OF TEACHING BASIC COMPUTER COURSES IN MEDICAL SCHOOLS

With the development of the times, many medical schools in China have repositioned their introductory computer courses. Some colleges and universities have jointly issued a reform plan for introductory computer courses with "computational thinking" as the core, proposing that the leading task of teaching introductory computer courses should be shifted to cultivating students' computational thinking ability [1].

This shift reflects a reconceptualization of the goals of computing education, which are teaching students the skills to use computers and software and developing their problem-solving and logical thinking skills. Computational thinking includes core concepts such as abstraction, algorithm design, data analysis, pattern recognition, and automation, all essential skills in modern medical and bioinformatics research [2].

Through this reform, medical schools hope that students will be better able to utilize computational tools and methods to process complex medical data, conduct scientific research, and apply information technology more effectively in their future careers.

3.1 Insufficient Depth of Content Taught in Basic Computer Courses

Upon investigation, it was found that in most medical schools in China, computer courses are usually categorized as a general education category, and all non-computer majors are required to take this introductory public course. However, there are significant differences in the scheduling of credit hours and the depth of teaching among schools. In some colleges and universities, only two hours per week are arranged for the course, and teachers mainly teach the theory class to explain the fundamental theories of computers. In contrast, the practical operation class mainly allows students to practice using commonly used software.

There are several problems with this teaching model:

- Insufficient cultivation of computational thinking ability: The teaching content mainly focuses on fundamental theories and basic software operations, failing to effectively cultivate students' computational thinking ability. Computational thinking includes core concepts such as abstraction, algorithm design, data analysis, pattern recognition and automation, often neglected in the existing teaching mode.
- Single teaching content: The course content is too single and lacks depth and breadth. What students learn is mainly some basic knowledge and simple operations, which cannot meet the high requirements of computer technology in modern medical research and practice.
- Lack of integration with the medical profession: The existing teaching content needs to be in touch with the actual needs of the medical profession and reflect the specific application of computer technology in the medical field. It is difficult for students to see the connection between computer technology and their specialities in learning, resulting in low interest in learning and insufficient application ability.

These problems indicate that the current introductory computer courses in medical schools need to undergo in-depth reforms to increase the depth and breadth of teaching content, strengthen

the cultivation of computational thinking skills, and focus on the integration with medical specialities in order better to meet students' future career needs and development..

3.2 The Small Number of Hours Contradicts the Large Amount and Depth of Content Required for Teaching and Learning

The construction of new medical science requires medical students to not only master basic computer knowledge but also to understand and apply the current widely used technologies such as big data, cloud computing, and artificial intelligence. However, due to many medical speciality courses and limited total credit hours, most medical schools must reduce the credit hours of introductory computer courses [3]. This contradiction between credit hours and content is mainly reflected in the following aspects: (1) extensive course content but limited credit hours: introductory computer courses need to cover many aspects such as basic operating systems, office software, programming basics, data processing, and at the same time, it is also necessary to introduce cutting-edge technologies such as big data, cloud computing and artificial intelligence. However, it is difficult to fully cover these contents with limited credit hours [4]. (2) Weak student foundation: Many medical students need a more robust computer foundation when they enter the program and need to start learning from the basics. This further limits the possibility that the course can explore advanced technologies in depth. (3) Difficulty in realizing deep learning: Due to the limited school hours, the courses can only be superficial and cannot explore and practice advanced techniques in depth. As a result, students need to use more computer technology to solve practical problems.

3.3 Insufficient Integration of Teaching Content and Specialization

Currently, computer-based courses in many medical schools are usually taught by the school's network centre or computer-related faculty. The curriculum standards of these courses are usually applicable to all non-computer specialities after they are developed. This unified teaching model leads to similar teaching contents and cases for all specialities, which needs more in-depth integration and relevance to medical specialities.

4. REFORM METHODS OF COMPUTER BASIC COURSE IN ARTIFICIAL INTELLIGENCE ENVIRONMENT

With the wide application of artificial intelligence in education, the form, mode and application of education are changing. Although the essence of education remains unchanged, the requirements for talent cultivation are constantly improving. This paper takes artificial intelligence as an orientation, emphasizes the characteristics of medical applications, closely combines the characteristics of medical specialities, and proposes a reform method for introductory computer courses. The goal of the reform is to gradually transition from teaching students simple and practical computer skills to enabling them to understand computer principles and ultimately cultivate their ability to use computational thinking skills to solve medical speciality problems [5].

4.1 Changing the Teaching Philosophy and Establishing the Status of Basic Computer Courses

Although currently a public course in colleges and universities, the introductory computer course should be considered compulsory for the subsequent study and research of students in all specialities. Therefore, higher education institutions should fundamentally establish the importance of this course, incorporate it into the category of compulsory courses, and reasonably increase the allocation of class hours. In addition to regular teaching and laboratory hours, a certain number of seminar hours should be added to promote in-depth learning.

Teachers of the course should be full-time teachers specialized in computer science to ensure the quality of teaching. At the same time, the school should regularly organize teaching training, seminars, and competitions on the course to update the teaching concepts of teachers and fundamentally raise the degree of importance attached to the course. These measures ensure that the critical position of the introductory computer course in medical professional education is fully reflected.

4.2 Constructing Computerized Teaching Resources with Medical Characteristics

In order to effectively cultivate students' computational thinking ability, it is necessary not only to build a reasonable curriculum system but also to optimize and update the existing teaching content, teaching materials and related resources. Under the premise of ensuring the consistency of knowledge transfer, the proportion of basic theoretical computer knowledge should be appropriately reduced, and knowledge modules that can reflect computational thinking, especially theories and methods related to medical problems, should be increased. The design of course cases should be more integrated with practical applications in the medical field to broaden students' horizons and cultivate their ability to use computational thinking to solve medical professional problems.

4.3 Utilizing Artificial Intelligence to Revolutionize Classroom Teaching Models

Artificial intelligence profoundly changes the learning environment, teaching mode and teacher-student relationship. Through artificial intelligence and big data technology, teachers can analyze students' overall and individual situations and preset the focus of classroom teaching for students' weak points. Integrating artificial intelligence and education promotes the transformation of the teaching mode and plays a vital role in educational reform and innovation [5]. Schools should carry out artificial intelligence innovation education courses to stimulate students' hands-on practice and innovation ability and cultivate talents with composite skills for the future.

4.4 Avoiding AI-enabled Test-based Education

In order to avoid the test-oriented tendency of the educational application of artificial intelligence, it is necessary to change the teaching model to centre on "lecture, test, examination and practice". Artificial intelligence should play a more active role in reducing the burden on teachers, lowering students' learning pressure, and promoting the overall development of students' moral, intellectual, physical, social and aesthetic development [6]. Through the rational application of artificial intelligence technology, a more humane and personalized education can be achieved, honestly promoting the overall development of students.

5. FEATURES & INNOVATIONS

Based on the actual needs of medical schools, a teaching reform model oriented to "artificial intelligence" and centred on "computational thinking" is constructed, aiming to comprehensively improve students' computational thinking ability, including its shaping, strengthening and enhancement [6].

5.1 Initial Development of Computational Thinking Skills

Introduction to Computational Thinking is a required general education course for newly enrolled first-year students. The course introduces basic computer applications and operations, helps students understand the basic principles and methods of computers in solving medical problems, and develops basic problem-expression skills to enable students to recognize the importance of computational thinking initially.

5.2 Computational Thinking Skills Enhancement

In the intensive stage, the programming course will teach students to use computer technology to solve professional problems. Given the simplicity and ease of learning the Python language and its wide range of applications in fields such as medical artificial intelligence and the Internet of Things, the school's programming courses will be taught in Python as the primary language and in conjunction with medical case studies to strengthen students' ability to use computational thinking to solve medical problems.

5.3 Computational Thinking Skills Enhancement

The enhancement of computational thinking skills is primarily achieved through specialized cross-fertilization courses. These courses are usually offered as limited elective courses, which students can take according to their professional needs. For example, courses such as Medical Artificial Intelligence, Medical Image Processing, and Medical Data Analytics will provide important support for students' future clinical and research work.

5.4 Student-centered Blended Learning Model

A student-centred blended teaching model combines traditional classroom teaching with online learning, using modern educational technology to enhance teaching effectiveness and students' independent learning ability. Through this mode, students can not only obtain guidance from teachers in the classroom but also carry out independent learning and practical operations through the online platform, thus realizing personalized learning and comprehensive development.

6. CONCLUSION

In the face of the actual situation of current medical schools, the introductory computer courses should be closely integrated with the medical professional training program, build a curriculum system with artificial intelligence as the core, and emphasize the cross-fertilization of computer technology and medical disciplines. The cultivation of computational thinking ability can be divided into three stages: initial shaping, gradual strengthening and comprehensive enhancement. The curriculum content should be optimized with the characteristics of medical specialities, diversified teaching methods should be adopted, a student-centred hybrid teaching mode should be implemented, and process assessment should be implemented. Students will be trained to utilize computational thinking to solve medical problems by organizing regular training and seminars, updating teaching materials, and setting up medical cases. Ultimately, it will be committed to exploring practical ways to cultivate intelligent and innovative medical talents to meet the demand for medical talents in the new era, avoid the tendency of test-taking in AI education, and promote the all-round development of students.

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