Artificial Intelligence Enabling Computer Education in Universities: Current Status and Strategies

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Abstract
Artificial intelligence has triggered a new round of technological transformation, bringing challenges and opportunities to computer education in universities. The study analyzes the characteristics of generative artificial intelligence, explores its potential application in teaching, and elaborates on the new challenges faced by current computer education in universities, including the poor effectiveness of hierarchical teaching, the need to improve the practical ability of curriculum design, the need to strengthen the synchronization between textbook updates and new technologies. Based on this, corresponding development strategies are proposed, including building intelligent teaching platforms and conducting personalized learning; introducing project-based learning, strengthening practical operation and evaluation feedback; generating learning materials from multiple sources and continuously updating teaching content.

Keywords
Artificial Intelligence, Computer Education and Teaching, Personalized Learning, Project-based Learning

Computer education in colleges and universities faces a lot of challenges in cultivating computer application talents, such as the rapid updating of knowledge and the diversification of students' needs. After the application of generative artificial intelligence, with the intelligent teaching platform and learning programs that can meet individual needs, it can help students to master computer knowledge and related skills more effectively. Therefore, the study of generative artificial intelligence to give energy to computer education in colleges and universities is of great significance.

Generative AI is an intelligent system capable of generating new content based on input data and is widely used in a variety of domains, including text, image, audio and video[1]. The characteristics of this technology include a high degree of creativity and flexibility, and the ability to generate personalized results based on user needs. Meanwhile, the technological roots of generative AI focus on relying on more advanced algorithms such as deep learning, natural language processing, and generative adversarial networks[2]. Specifically, the potential of generative artificial intelligence in the field of computer education focuses on three points:

(1) Personalized learning experience: After analyzing students' learning habits, interests and abilities, generative AI can tailor the learning content and progress for each student, thus enhancing learning efficiency and students' interest in learning[3].

(2) Educational content generation and optimization: Teachers can use generative AI tools to quickly generate teaching materials, as well as exercises and assessment tools, which save a lot of time and effort[4].

(3) Continuous optimization of teaching

content: by analyzing the feedback given by students and the results of their learning, generative AI can carry out continuous optimization of teaching content and teaching methods to ensure that the quality of education is steadily improved.

Status and challenges of teaching and learning

In the era of rapid development of information technology, computer education in colleges and universities is facing many opportunities and various challenges never seen before. The social level for professional computer talent demands continuous increase, in this case, the development direction of computer education also increases more people's widespread concern.

In actual teaching, there is a gap in the basic level of students, although teachers use layered teaching, but the effect is not good. The main reasons include the following. First, teachers have insufficient resources and limited support, which makes them face many difficulties in designing the teaching content and assessment criteria for different levels. Secondly, students may feel psychologically uncomfortable because they are classified at a lower level, which will have an impact on their motivation and self-confidence in learning.

The curriculum of computer science majors contains a lot of theoretical courses, while the number of practical courses is relatively small, which will make students' practical ability lacking. First, when universities arrange the courses, they are often subject to the limitations of teachers' strength and hardware facilities. Secondly, the traditional teaching evaluation system is more inclined to quantitative assessment, and it is easier to standardize the scores of theoretical examinations, while the evaluation of practical ability requires a more complex evaluation mechanism[5]. In addition, the depth and breadth of the current school-enterprise cooperation is still insufficient, and it is difficult to effectively integrate the real project resources of enterprises into classroom teaching.

Knowledge and technology in the field of computer science is changing rapidly, however, universities are lagging in curriculum and textbook updating, which results in a disconnect between what students learn and what they need. The whole process of textbook preparation and publication often takes a long time, while the computer technology outside the university has been updated many times. As a result, the content of the textbook is difficult to reflect the latest research results and application of practice in a timely manner, at the same time, many colleges and universities tend to be conservative in the review mechanism of the textbook, the lack of rapid introduction of emerging technologies and the mechanism of timely updating, which makes it difficult for new content to quickly enter the teaching system.

Innovative Strategies for Teaching and Learning

Intelligent teaching platform relies on data analysis and machine learning technology to understand the learning status of students and their needs in real time, and then builds up a learner's profile, which is used to formulate a learning program with personalized characteristics for each student[6]. The traditional teaching mode is generally difficult to take care of the individual differences of each student, but the intelligent teaching platform can be based on the student's learning process, their own interest and ability level and other aspects, the teaching content and difficulty to be automatically adjusted. This kind

of personalized learning can not only improve the learning efficiency of students, but also enhance their interest and initiative in learning[7]. In the construction process of the intelligent teaching platform, generative artificial intelligence can play an important role. By analyzing students' learning data, AI can generate learning paths and resources suitable for different students. For example, if a student is learning the loop structure in Python, AI can prompt the correct syntax and usage in real time when he or she tries to use loops. Students can not only master programming quickly but also build a knowledge framework in practice.

Project-based learning focuses on the implementation of real projects to promote the comprehensive ability of students. As far as computer education is concerned, project-based learning can effectively resolve the situation of a single learning scenario, which is conducive to the application of theoretical knowledge to practice, and can also cultivate students' teamwork and problem-solving skills[8].

With the help of generative AI tools, teachers can quickly generate the project cases and tasks needed for computer courses, which helps students to understand and master the relevant knowledge more effectively[4]. For example, AI can automate the generation of a project assignment based on the specific course content, which gives background information on the project and defines its objectives. On the one hand, generative AI saves teachers' time, and on the other hand, it ensures that project content is diverse and innovative[6]. In project-based learning, generative AI also facilitates collaboration and communication between students. Through the intelligent platform, students can easily share the progress of the project, discuss issues and learn from each other. The collaborative learning model helps to improve students' practical skills on the one hand, and their communication and teamwork skills on the other[9]. For example, in a web application development project, generative AI can provide students with code snippets, design suggestions and test cases to help them complete the project.

Generative AI can obtain information from a variety of sources, such as academic papers, disciplinary forums, online courses, and industry reports. After analyzing and integrating this information, the AI can generate new digital teaching materials, such as course handouts and lab guides[10]. These digital learning materials generated from multiple sources can enrich the original teaching content, give students a broader perspective on learning, and provide students with relevant resources on the cutting edge of the discipline[11]. In addition, generative AI can also dynamically adjust the content and difficulty of learning materials according to the learning situation of students, ensuring that each student can obtain digital learning resources suitable for him or her.

When carrying out teaching activities, teachers can be based on scientific principles and theoretical models in the field of computer science, with generative artificial intelligence to design and timely adjustment of digital computer course content, while taking into full account the needs of students in the dynamic changes in the various types of needs, so as to generate and students cognitive ability to match the teaching plan and assessment standards. This integrated learning and practice digital teaching model not only promotes the implementation of the teacher's teaching effectiveness but also ensures the diversity and innovation of the course content.

Teachers can devote more energy to the improvement of teaching methods and personalized guidance for students, thus improving the overall quality of teaching.

Conclusion

The effective use of generative artificial intelligence in the field of computer education and teaching in colleges and universities can open new ideas and methods for education and development. With the construction of an intelligent teaching platform, the introduction of project-based learning mode and multi-source learning material generation strategy, educators can more effectively deal with the challenges encountered in education, on this basis, can further enhance the learning experience of students, while helping to enhance their practical ability.

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