

Artificial Intelligence Empowers Innovation in Teaching of Public Computer Courses

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Abstract: This paper expounds the core characteristics of artificial intelligence and its application potential in the field of education, analyzes the challenges currently faced by computer public course teaching, and proposes innovative strategies and methods to effectively integrate artificial intelligence into computer public course teaching. It uses large language models for personalized teaching, optimizes teaching content through knowledge graphs, and uses recommendation systems to improve practical operation capabilities. The course teaching system that supports the entire process of "learning - teaching -evaluation-continuous improvement" realizes personalized and customized learning , promotes the advancement of traditional computer public course teaching with the support of artificial intelligence technology and tools , and assists teachers in completing teaching evaluation. Through teaching empirical research, it is shown that it can better support teaching, facilitate the updating of teaching knowledge, help improve practical operation capabilities, and cultivate autonomous learning ability, thereby improving teaching quality and effectiveness.

Keywords: Artificial Intelligence; Public Computer Courses; Teaching Innovation; Personalized Teaching

1. Introduction

With the advancement of modern science and technology and the rapid development of information technology, artificial intelligence technology has not only achieved remarkable results in the fields of industry and science and technology, but also demonstrated strong application potential in the field of education. In 2018, the Ministry of Education

promulgated the "Innovation Action Plan for Artificial Intelligence in Higher Education Institutions", which marked that artificial intelligence in China was officially included in the national strategy and deeply integrated with education, opening a new chapter in the relationship between artificial intelligence and education [1].

The combination of artificial intelligence technology and education will bring new challenges and opportunities to the teaching reform of college courses. Artificial intelligence has gradually penetrated the field of education. We can better meet the learning needs of students and provide them with a more personalized learning experience.

First, AI technology can tailor learning plans and teaching content for each student based on their learning situation and characteristics. It can analyze students' learning data to understand their learning styles, strengths and weaknesses, so that each student can learn at their own pace and within their own ability.

Secondly, artificial intelligence technology can improve learning outcomes. Through intelligent recommendation algorithms, artificial intelligence can recommend learning resources and materials suitable for students' learning levels and interests, and provide students with timely feedback and guidance to help them overcome difficulties and solve problems.

In addition, artificial intelligence technology can also provide teachers with more teaching aids. For example, the intelligent grading system can help teachers quickly and accurately grade students' homework and exams, analyze students' learning data, reduce teachers' workload, help teachers better understand students' learning status, and adjust teaching strategies in a timely manner.

In short, the combination of artificial intelligence technology and education will

bring new challenges and opportunities to the teaching reform of college courses. By applying artificial intelligence technology, we can provide each student with personalized learning plans and teaching content to improve learning outcomes. However, we also need to pay attention to the challenges brought about by the application of artificial intelligence technology and actively respond to them to ensure the fairness and sustainable development of education.

My school mainly include "College Computer Basics", "Computer Networks", "Database Application Technology" and "Programming Language". The key areas of the courses are shown in Table 1. It is an inevitable trend to empower public courses with artificial intelligence, which will bring huge challenges to the traditional teaching model of "knowledge transfer" [2].

Table 1. Key Areas of Computer Science Courses

course name	Key Areas
Basic Computer Science	Documentation and data presentation Programming and Algorithm Basics Network Basics and Applications Computer Security Basics
computer network	Data Communication Principles Network equipment and functions cyber security Network management and maintenance
Database Application Technology	Data Modeling Database Design Database Programming Database security and maintenance
programming language	Programming language basics Object-oriented Programming Data Structures and Algorithms Project development practice

2. Personalized Learning Experience

In the traditional computer public course teaching model, the design and implementation of the course are usually centered on the teacher. In this model, the teacher plays the role of knowledge transmitter, while the students mainly passively accept knowledge.

This teaching method limits the initiative and creativity of students to a certain extent, because they can only learn according to the teacher's ideas and pace. However, with the advent of the artificial intelligence era, the field of education is undergoing a profound change. In this new era, the focus of education has gradually shifted from teachers to students. Personalized learning has become one of the important development trends of education [3]. By using artificial intelligence technology, we can provide them with more customized learning resources and support. This personalized learning method helps to stimulate students' interest and motivation in learning, and improve their learning effects and grades. At the same time, personalized learning also encourages students to actively participate and explore. They can choose learning content according to their interests, solve problems and complete tasks through independent learning and collaborative learning [4]. This learning method cultivates students' creativity, critical thinking and teamwork skills, laying a solid foundation for their future development.

For public computer courses, artificial intelligence technology can be used to build virtual laboratories and programming environments, allowing students to learn through practice and exploration, and cultivate hands-on skills and problem-solving skills ; artificial intelligence is used to simulate complex network scenarios, allowing students to observe the impact of different configurations on network performance when learning network design and optimization ; artificial intelligence simulation tools are used to teach how to perform data modeling according to different business needs , and artificial intelligence technology is used to create a virtual environment, allowing students to learn how to design database architecture and perform operations such as table creation and index optimization through practice ; at the same time, artificial intelligence technology can also provide intelligent learning assistance tools to help students better understand and master programming knowledge and skills. Personalized learning of public computer courses is shown in Figure 1.

3. Wisdom Leads, Teaching Innovation

Artificial intelligence empowers changes in

traditional teaching content and teaching schedules, supports the curriculum teaching system of the entire process of "learning - teaching -evaluation- continuous improvement

", improves teachers' teaching abilities and students' learning outcomes, and achieves the teaching effect of "knowing what to learn and how to learn".

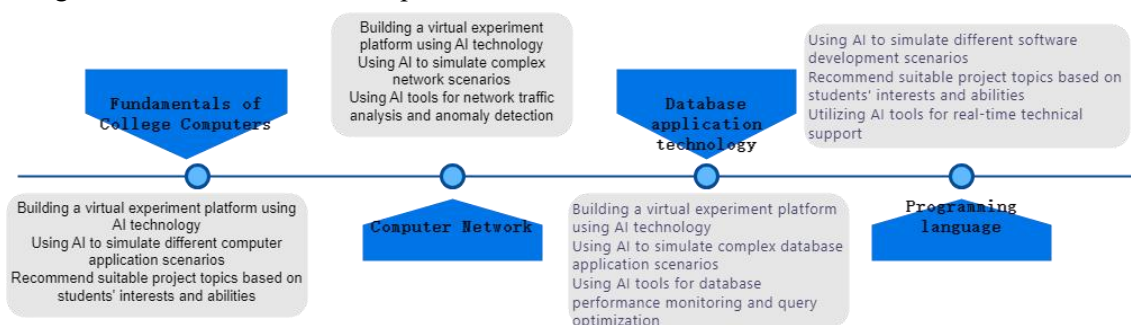


Figure 1. Personalized Learning for Public Computer Courses

Through AI-enabled teaching, students' learning methods have changed. Personalized and customized learning has become possible [3]. For example, intelligent recommendations for objective questions that integrate knowledge points focus on mastering basic knowledge; intelligent recommendations for subjective questions focus on mastering difficult and important knowledge and hands-on skills. At the same time, we build student profiles, sort out personal preferences and ability levels, analyze individual learning ability differences and different learning needs among students, implement stratified and classified teaching content and teaching progress, and comprehensively improve students' autonomous learning ability.

Through AI-enabled teaching, teachers' teaching methods have changed. It cleverly solves the contradiction between students' personalized learning needs and teachers' limited time and energy [5], and like an icebreaker, it has opened up a new channel for teaching reform. Through AI analysis results, teachers can take a two-pronged approach inside and outside the classroom. In the classroom, they focus on students' common problems, and in extracurricular, they teach students in accordance with their aptitude to meet students' personalized development needs, thus achieving both internal and external teaching. At the same time, AI can be used to gain insight into students' inner world and capture their actions in the classroom, helping teachers gain insight into students' emotions and learning status, just like a spiritual mentor, providing more accurate guidance and support for students' learning.

By empowering teaching with artificial

intelligence, the way of evaluating and providing feedback on teaching results has changed. The non-low-level examination system can realize automatic marking, automatic code duplication checking, automatic cheating detection, and data visualization analysis, making the evaluation results clear at a glance [6]. At the same time, through accurate analysis of the time sequence relationship of students' learning and the timestamp of code submission, artificial intelligence can depict the growth trajectory of students, allowing teachers to gain insight into students' learning outcomes [7]. Teachers can choose different teaching goals and content and implement different teaching methods based on these analysis results, further improving the pertinence, effectiveness and scientific nature of teaching and learning [8]. Such a teaching evaluation and feedback system can better help students and teachers understand learning progress and problems, and promote students' learning growth.

4. The Key Points of AI-enabled Teaching

Supported by artificial intelligence technologies and tools, it promotes the advancement of traditional computer public course teaching and assists teachers in completing teaching evaluation.

First of all, "data + rules" is the premise of artificial intelligence. Therefore, it is necessary to solve the key core points that must be solved, such as how to obtain student data, which data should be collected, and how to build accurate and efficient rules and knowledge graphs.

(1) Construct the knowledge graph of the course. For each course, we need to carefully construct its own knowledge graph. This

requires sorting out the knowledge points of each chapter and analyzing their internal dependencies, asking domain experts to evaluate and determine; using a graph database for storage; dividing and annotating existing resources, including video resources, courseware resources, homework resources, programming question resources, etc., into knowledge points, and binding them to the knowledge graph to provide strong support for teaching.

(2) Connect with the basic data of the student database of the Academic Affairs Office as the basic data for building personal portraits. At the same time, collect relevant information including subject competitions, personal strengths, interests and hobbies, etc., which will be used as the basis for the initial recommendation of students' teaching content knowledge points and subjective questions.

(3) Connect to online learning systems, such as the Super Star platform, to extract students' historical learning behaviors, including the knowledge points, viewing time and duration of videos and courseware that have been viewed; extract students' homework scores and the knowledge points corresponding to the homework as the source of historical learning data [9]. Use machine learning on the artificial intelligence platform, such as collaborative filtering recommendation, time series recommendation, deep convolution method, etc., to accurately recommend new teaching content knowledge points.

Secondly, intelligent perception is the key point of application for students. Taking the database application technology course as an example, students design databases, including recommendations for the same type of design questions and different levels of difficulty.

(1) When a student passes a design question, the system intelligently determines whether the student has mastered the current knowledge point based on the number of similar design questions and the answer results.

(2) Intelligent perception can sense students' anxiety, especially based on the number of errors and modification submissions. After completing the knowledge point similarity query, it recommends corresponding knowledge points for students to review and consolidate.

(3) When students have learned a knowledge point, the system recommends questions of the

same type and difficulty to the student. When AI assesses that students have mastered the relevant knowledge points, it continues to recommend difficult questions to stimulate students' enthusiasm for challenges.

The third is to analyze the weaknesses of students' learning abilities, so both common and individual problems need to be solved. This is the key goal of artificial intelligence empowerment.

(1) Based on big data analysis and machine learning, common problems or frequently occurring errors are intelligently extracted, prompting teachers to focus on explaining them offline.

(2) Based on the answering time and submission times of subjective questions, we sort out the individual differences of each student and provide one-on-one answers to help each student set sail on the road of seeking knowledge.

(3) Based on video analysis technology, students' movements, behaviors, and facial expressions in class are analyzed to help teachers better understand students' emotions and learning status, making teaching more intimate and vivid.

Finally, in terms of teaching evaluation, how to provide supporting assessment methods is the key point for improvement of teachers.

(1) We check the similarity of program questions to monitor each student's independent programming and guard against plagiarism. Therefore, we use deep learning methods to build a personalized code style to identify whether the code submitted by the student is his or her own.

(2) Using machine learning methods, we try to automate test-taking and automatic marking. Based on the student's personal profile and course knowledge graph, we set the test paper according to probability distribution, automatically mark the test paper, and conduct visual grade analysis to assist in invigilation and examination affairs.

(3) Student data reports and class data reports are automatically generated, allowing students to download answer sheets and see the reasons for the grading scores, etc. This not only simplifies teaching affairs, but also promotes the innovation of teaching methods invisibly. It makes teaching more transparent and efficient, and also creates a more autonomous and active learning environment for students.

5. Teaching Practice Based on Large Language Model

The public computer courses enabled by artificial intelligence should stimulate students' interest in learning and cultivate their ability to solve problems using computers.

Pre-class preparation and self-starting: We encourage students to prepare before class and sail in the ocean of knowledge on their own. By publishing textbooks, PPTs and designated textbook reading ranges involved in course teaching, we guide students to actively acquire knowledge and improve their self-learning ability. At the same time, with the help of large language models such as GPT, students can get inspiration and ideas for programming and be fully prepared for classroom learning.

Interaction in class, collision of wisdom: According to the individual differences of students, we gradually adopt a variety of teaching methods and learning guidance strategies. We provide detailed answers to the key and difficult points and common problems in the preview to ensure that students can master the core knowledge. Combined with the voting function of the "Learning Pass App" of the Chaoxing platform, we attract students to actively participate in teaching and understand their mastery in real time. In addition, by interacting with large language models such as GPT, students can obtain generated answers and detailed analysis, which further guides their thinking and keeps up with the progress of the class.

After-class extension and in-depth research: After class, we assign research questions and encourage students to search for information independently to deepen their understanding of knowledge. They can "ask for advice" from large language models such as GPT to obtain problem-solving ideas, thereby broadening their horizons and improving their problem-solving abilities [10].

Smart teaching, empowering the future: The teaching practice based on the large language model not only stimulates students' interest in learning, but also cultivates their ability to use computers to solve problems. In such teaching reforms, students can actively acquire knowledge, actively participate in teaching, deepen research, and realize the true meaning of learning. In the future, we will continue to explore new paths for smart teaching and

empower students' all-round development.

6. Conclusion

Artificial intelligence empowers teaching, just like giving wings to education. Through the in-depth application of cutting-edge technologies such as large language models, knowledge graphs, and recommendation systems, it not only improves the quality of classroom teaching, but also significantly improves students' learning outcomes. It has opened up a new path for stratified and classified teaching, allowing each student to thrive in the learning environment that best suits them.

Artificial intelligence empowers teaching and achieves a perfect combination of personalized and differentiated teaching. It accurately captures the learning needs of each student and tailors a learning path for them, so that every child can find their own oasis in the ocean of education. In such a teaching environment, students' enthusiasm for learning is fully ignited and their potential is stimulated to the greatest extent.

However, AI-enabled teaching is not something that can be achieved overnight. We need to constantly explore new methods and models for teaching public computer courses. In this process, we need to pay special attention to balancing the roles of teachers and students, both giving full play to the guiding role of teachers and respecting the dominant position of students, and ensuring effective interaction and active participation of students in the teaching process.

Looking into the future, AI-enabled teaching will bring more possibilities. Let us work together to continuously explore the application of new technologies and new methods in the field of education, create a better learning environment for students, and jointly draw a bright future for education.

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