ISSN 2522-6398 Vol. 8, Issue 4: 245-249, DOI: 10.25236/FER.2025.080436

AI-Driven Teaching Model for Computer and Information Technology Courses in Universities

Ma Yue*

School of Intelligent Science and Engineering, Xi'an Peihua University, Xi'an, China
**Corresponding author*

Abstract: *The deep integration of artificial intelligence (AI) technology in education has provided new opportunities for innovation in university teaching models. This study focuses on Computer and Information Technology courses in higher education, constructing an AI-based "Teacher-Machine-Student" tripartite collaborative teaching model and validating its effectiveness through empirical research. A comparative experiment was conducted using two parallel class samples to systematically analyze the application effects of AI technology in personalized learning, intelligent assessment, and teaching interaction. The results show that the AI-driven teaching model significantly improves students' academic performance (average increase of 15%) and classroom engagement (increase of 20%), while optimizing teaching efficiency for instructors. This research not only provides theoretical support for the reform of computer courses in universities but also offers practical references for the digital transformation of education.*

Keywords: *Artificial Intelligence; Computer and Information Technology; Teaching Model; Personalized Learning; Educational Digitalization*

1. Introduction

The rapid development of artificial intelligence (AI) technology is profoundly reshaping the traditional landscape of education. The report of the 20th National Congress of the Communist Party of China explicitly proposed the strategic goal of "advancing educational digitalization," and the deep integration of AI technology with education is a crucial pathway to achieving this goa[1]l. As a core course for cultivating digital talent, the teaching model of Computer and Information Technology in universities urgently requires innovation to adapt to technological advancements and societal demands[2]. However, current teaching practices in this course still face several challenges: (1) significant disparities in students' foundational knowledge, making personalized instruction difficult; (2) limited classroom interaction formats, leading to low student engagement; and (3) insufficient intelligent support systems, failing to meet differentiated learning needs.

A review of domestic and international research reveals that foreign scholars primarily focus on adaptive learning systems (e.g., Knewton, DreamBox) and intelligent educational robots, while domestic studies emphasize intelligent tutoring, learning analytics, and data-driven precision teaching[3]. Notably, research on AI-driven teaching models for university Computer and Information Technology courses remains in its early stages, lacking systematic theoretical frameworks and practical solutions. Based on this, this study proposes an "AI-Driven Teaching Model for Computer and Information Technology Courses in Universities," aiming to establish a new paradigm for intelligent teaching and provide actionable pathways for course reform.

2. The Importance of Course Development in the AI Era

2.1 Meeting the Demand for Interdisciplinary Talent

In the era of artificial intelligence(AI),there is an urgent social demand for interdisciplinary talents who not only possess a solid foundation in computer science but also have the ability to apply AI technologies. As AI technologies are widely applied across various industries, ranging from healthcare and finance to manufacturing, professionals capable of integrating traditional techniques with AI are in high demand. Universities, as the main battleground for talent cultivation, urgently need to reform their curricula to meet this demand. Optimizing the construction of the" Computer and Information

ISSN 2522-6398 Vol. 8, Issue 4: 245-249, DOI: 10.25236/FER.2025.080436

Technology" curriculum can not only enhance the quality of talent cultivation but also supply professionals who can adapt to the evolving times to various industries. For instance, by offering courses such as AI programming and data analysis, students can acquire cutting-edge technologies and better adapt to future career requirements.

2.2 Promoting Disciplinary Innovation and Development

The rapid development of AI technologies has brought new research directions and growth points to the field of computer science. The emergence of AI has not only changed the research paradigm of computer science but also promoted the development of interdisciplinary research. By integrating cutting-edge AI theories and technologies into the curriculum, the discipline can remain up-to-date, enhancing its overall level and influence. For example, the latest research findings in fields such as deep learning and natural language processing can be introduced into the curriculum to help students understand and master frontier technologies. Meanwhile, the cross-disciplinary integration of AI with mathematics, physics, biology, and other disciplines also provides new ideas and methods for disciplinary innovation. This interdisciplinary curriculum not only enriches the teaching content but also promotes the sustainable development of the computer and information technology discipline.

2.3 Enhancing Students' Core Competitiveness

In the context of AI, students need to possess stronger innovation capabilities, critical thinking, and the ability to solve complex problems. These skills are crucial for competitiveness in the future job market. By innovating teaching methods in the curriculum, such as adopting project-based learning and blended learning, and strengthening practical components, students' enthusiasm for learning can be effectively stimulated, and their overall quality can be cultivated. For example, students can gain a deep understanding of the application scenarios and solutions of technologies by participating in AI project practices. Additionally, AI courses can provide personalized learning paths for students through intelligent recommendation systems and adaptive learning platforms, helping them better acquire knowledge and skills. This personalized learning model not only improves learning efficiency but also enhances students' competitiveness in the future job market.

3. The Current Status and Problems of "Computer and Information Technology" Course Teaching in Universities

3.1 The Teaching Content Is Outdated and Fails to Meet the Needs of Reform

At present, the rapid development of computer science, engineering, and software technologies has led to a continuous shortening of the knowledge update cycle. This requires the" Computer and Information Technology" course to break through the limitations of traditional application software and hardware in the selection of teaching content, introduce cutting-edge content in the field of computer science, and guide students to abstractly understand and express computational principles and methods. The course should not only be limited to the application of office software but also be widely applicable to professional positions. However, the current situation is that the course content construction still focuses on traditional skill training and lags far behind the development of the discipline. The course knowledge points are too scattered, lack a clear logical thread, and the textbooks and teaching content are mainly based on term explanations. The knowledge is wide but not deep, with few knowledge designs that match the needs of professional positions, and there are problems of content repetition, making it difficult to meet the practical needs of reform.

3.2 Limited Class Hours and Insufficient Teaching Continuity

The goal of the" Computer and Information Technology" course is to enable students to master the basic knowledge of computers and the ability to solve problems ,and to integrate the teaching of this course with the characteristics of professional courses and the needs of job positions. This requires the course to expand its content, teach professional theories and concepts, and involve computer knowledge related to professional courses. However, as a required public course, it mostly adopts large-class teaching methods. The teaching process management is complex, and the implementation of teaching activities is difficult. The limited class hours cannot bear the increasing teaching content. Many teachers spend too much time on knowledge explanation, using repetitive emphasis and

ISSN 2522-6398 Vol. 8, Issue 4: 245-249, DOI: 10.25236/FER.2025.080436

explanation to help students memorize a large amount of information. The time and space left for students to think independently are limited, resulting in low knowledge transformation rate of students and the failure to cultivate their ability to think and solve problems independently. The overly traditional teaching methods also easily make students feel tired and gradually lose interest in the course.

3.3 Single-Mode Practical Teaching and Loose Integration of Theory and Practice

Although most colleges and universities adopt the integrated teaching mode of theory and practice, that is, arrange students to conduct practical training in the computer room after completing the explanation of theoretical knowledge, here are still many problems in practical teaching. The types of practical activities are monotonous，with little involvement of emerging information technologies, and the overall teaching is oriented towards qualification exams, resulting in a loose integration of theory and practice and a failure to fundamentally promote the comprehensive improvement of students' information literacy. Specifically, in practical teaching, verification experiments dominate, and teachers' classroom explanations take up too much time, leaving students with few opportunities for independent operation and little room for self-expression, leading to slow development of practical skills.

4. Construction of the AI-Driven Teaching Model

4.1 Theoretical Framework

In the context of the booming digital education, this study innovatively constructs a "teacher-machine-student" ternary collaborative teaching model based on constructivist learning theory and blended teaching philosophy. This model breaks through the traditional binary structure dominated by teachers and students, and skillfully introduces an AI system as an "intelligent teaching agent", thereby forming a dynamic and vibrant new teaching ecosystem, bringing new changes to teaching practice.

In this model, the role of the teacher has undergone a profound transformation. Instead of being merely a knowledge transmitter, the teacher becomes a learning designer and guide. They carefully design teaching activities, build a framework for students' independent learning, guide students to think deeply and explore the connotation of knowledge, and stimulate students' interest and potential in learning. Students, with the assistance of AI, can more efficiently achieve independent learning and collaborative inquiry. The AI system, leveraging its powerful technological advantages, undertakes important functions such as personalized recommendations, intelligent assessment, and learning situation analysis. It can accurately push suitable learning resources according to each student's learning progress and characteristics, timely assess students' learning outcomes in an intelligent manner, and comprehensively analyze students' learning situations, providing strong support for teachers' teaching decisions and helping students grow better.

4.2 Teaching Model Design

Design of an AI-Based Teaching Model for Computer and Information Technology Courses. This model encompasses course structure, teaching methodologies, and interactive approaches while identifying key elements such as adaptive learning, intelligent assessment, and real-time feedback. When developing a specific AI-driven teaching model for university-level Computer and Information Technology courses, it is essential to integrate AI technology throughout all teaching phases to enhance instructional effectiveness and improve student learning experiences.

Key implementations include:

1) Utilizing AI-adaptive learning platforms like Wolfram Alpha and Smart Sparrow to intelligently recommend personalized course resources and learning paths based on students' learning behaviors, academic performance, and interests;

2) Employing Kimi for data analysis in Excel instruction, automatically generating charts and reports to help students understand data sources and strengthen their data analysis and processing capabilities;

3) Leveraging Tencent's Hunyuan large language model with natural language processing (NLP)

ISSN 2522-6398 Vol. 8, Issue 4: 245-249, DOI: 10.25236/FER.2025.080436

and machine learning technologies to facilitate interactive teaching in flipped classrooms.

The entire teaching model deeply integrates AI technology, forming a closed-loop structure of course preparation →course implementation → course improvement, achieving the goal of continuous optimization through iteration. The instructional design scheme is illustrated in Figure 1.

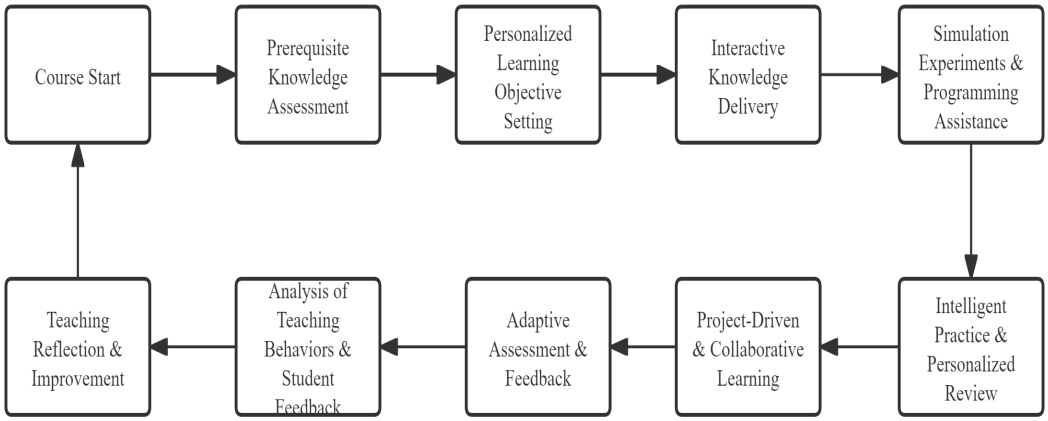

Figure 1. AI-Driven Instructional Model Design for Computer and Information Technology Courses

5. Empirical Research and Results Analysis

5.1 Experimental Design

In the computer science course of a university during the 2023-2024 academic year, two parallel classes(experimental class N=50,control class N=50)were selected for a comparative experiment. The experimental class adopted an AI-driven teaching model, while the control class maintained the traditional lecture-based mode. The experimental class utilized AI technology to provide personalized learning resource recommendations and real-time feedback based on students' learning progress and characteristics, thereby enhancing students' learning experience and outcomes. In contrast, the control class continued with the conventional classroom teaching method, relying mainly on teachers' lectures and students' class notes. Through this comparative experiment, the aim was to explore the advantages of the AI-driven teaching model in improving students' learning outcomes and teaching efficiency, providing empirical evidence for the innovation of teaching models in computer science courses.

5.2 Data Collection and Methods

This study employs a mixed-methods approach to comprehensively evaluate teaching effectiveness through both quantitative and qualitative data. The quantitative data include: (1) Academic Performance: The final exam scores from a uniformly designed test serve as an objective measure, with exam difficulty validated by the academic panel (Cronbach's $\alpha = 0.82$); (2) Class Engagement: Interaction data (including forum posts, in-class quiz completion rates, and assignment submission timeliness) are automatically recorded via the online learning platform (Moodle); (3) Teaching Feedback: A Likert 5-point scale questionnaire (student version $\alpha = 0.89$, teacher version $\alpha = 0.91$) is used, covering dimensions such as learning motivation and technological adaptability. Baseline data (admission scores and pre-test results) showed no significant differences between the two groups ($p > 0.1$), ensuring comparability.

5.3 Research Results and Analysis

Academic Performance: An independent samples t-test revealed that the experimental class's final exam scores ($M = 82.5$, $SD = 6.2$) were significantly higher than those of the control class ($M = 70.3$, $SD = 7.1$), $t(98) = 4.73$, $p = 0.028$, Cohen's $d = 1.12$, indicating a medium-to-large effect size for AI-enhanced teaching on knowledge acquisition.

Engagement: The experimental class averaged 15.2 interactions per week (vs. 12.1 in the control

ISSN 2522-6398 Vol. 8, Issue 4: 245-249, DOI: 10.25236/FER.2025.080436

class), with a Mann-Whitney U test yielding $p = 0.017$. The difference in assignment submission rates was statistically significant ($\chi^2 = 5.43$, $p = 0.02$).

Satisfaction: Questionnaire analysis showed that 85% of experimental class students agreed that AI-driven personalized recommendations improved learning interest (particularly in programming exercises), while teachers reported a 32% reduction in lesson preparation time (mean comparison $p < 0.01$). Qualitative interviews highlighted "real-time feedback" (38% frequency) and "adaptive learning" (25%) as key advantages.

6. Conclusions and Future Directions

6.1 Research Conclusions

This study confirms that the AI-driven teaching model effectively enhances teaching quality and learning outcomes in computer courses. By addressing issues such as insufficient personalization and interaction in traditional teaching, the model provides a replicable solution for university course reform.

6.2 Future Directions

In the rapidly evolving field of AI, future research should focus on:

1) Continuous optimization and iteration of intelligent teaching systems.

2) Mitigating over-reliance on technology to foster independent thinking.

3) Exploring more diversified AI-enhanced teaching models.

4) Strengthening ethical guidelines for AI applications in education.

This study serves as a practical case for the deep integration of information technology and education. Future work will further refine the teaching model to better align with the needs of educational digital transformation.

Acknowledgements

This study was supported by the Shaanxi Provincial Education Science"14th Five-Year Plan"General Project in 2024,titled"Research on AI-Driven Teaching Models for Computer and Information Technology Courses in Higher Education Institutions"(Project No.SGH24Y2690).

References

[1] Liu Sannüya, Hao Xiaohan. Challenges and Approaches of Generative Artificial Intelligence in Empowering Educational Innovation [J]. Tsinghua Journal of Education, 2024, 45(03): 1-12. DOI: 10.14138/j.1001-4519.2024.03.000112.

[2] Zhu Rui, Li Youshan, Chen Haiping. Innovation and Practice of Integrating Artificial Intelligence into Higher Education Teaching Models [J]. China Informatization, 2024, (06): 83-84.

[3] Wang Yunwu, Zhou Tian, Wu Yanan. How AI-Generated Content Transforms Education: A Rational Reflection on ChatGPT-like Artificial Intelligence [J/OL]. China Medical Education Technology, 1-9 [2024-07-04].

[4] Zhang Yuxin, Wang Xiaogen. Intelligent Educational Applications of AIGC: Functional Upgrades in AI Teaching Systems [J]. China Medical Education Technology, 2024, 38(03): 311-318. DOI: 10.13566/j.cnki.cmet.cn61-1317/g4.202403009.

[5] Wu Ning, Bo Junge, Cui Shuning, et al. Practice and Reflection on the Reform of Computer Fundamentals Teaching in the Big Data Era [J]. China University Teaching, 2020, (Z1): 42-45.