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Research on the Teaching Model of AIGC-Empowered Interdisciplinary Competence Cultivation for Postgraduates in Biomedical Fields

Yumei Li

School of Bioscience and Biotechnology, University of Jinan, Jinan 250022, Shandong, China

Abstract: This paper aims to explore an interdisciplinary postgraduate course teaching model based on AIGC (Artificial Intelligence Generated Content) technology. Taking the course Biomass Energy Engineering and Technology as the carrier, it constructs a "Four-Wing Intelligent Integration" interdisciplinary teaching model from four dimensions: AIGC-assisted reconstruction of interdisciplinary teaching content, iterative update of the Chaoxing AI teaching platform, AIGC-assisted flipped classroom, and AI intelligent evaluation and feedback. The model promotes students' personalized learning and the development of interdisciplinary competence, and a replicable AIGC interdisciplinary teaching model has initially taken shape, providing a reference for the digital and intelligent reform of postgraduate education and teaching.

Keywords: AIGC; Postgraduates; Interdisciplinary; Teaching model

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1. Introduction

Postgraduate education is the key "junction" of science and technology, talents and innovation, with the core goal of cultivating high-end talents with problem awareness, research thinking, and interdisciplinary research capabilities. However, how to improve postgraduates' problem awareness and scientific research thinking, and promote their interdisciplinary research capabilities in this field has become a bottleneck restricting the improvement of the quality of innovative talent cultivation [1].

AIGC (Artificial Intelligence Generated Content) technology, with its powerful data processing, pattern recognition, and intelligent generation capabilities, has brought revolutionary changes to education and teaching [2], including providing technical support for the improvement of personalized learning, empowering the cultivation of high-order cognitive skills, and reshaping teaching models through the reform of educational evaluation [3]. Studies have shown that AIGC can improve teaching efficiency to 96% and enhance students'

learning effectiveness and motivation [4]; when AIGC tools are strategically applied in teaching, the research results of interdisciplinary projects are improved by 37% [5]. Therefore, cultivating postgraduates' ability to discover problems, critical thinking ability, and interdisciplinary integration ability based on AIGC technology is an effective way to cultivate high-end innovative talents in the biomedical field.

At present, scholars at home and abroad have carried out research on the application of AIGC technology in postgraduate innovation education. Foreign research started early and has achieved good reform effects, such as using AIGC technology to create virtual biology laboratories, allowing students to conduct interdisciplinary experiments and data analysis in a virtual environment [6]; AIGC-based teaching resources, such as interdisciplinary curriculum design, problem-solving platforms, data analysis and visualization tools, and AI intelligent tutoring systems, provide a "scaffold" for the cultivation of postgraduates' interdisciplinary competence [7]; AIGC-based teaching reforms (including personalized teaching and intelligent evaluation) adapt to students' personalized learning needs, helping students improve learning strategies and learning effects [8].

Following the global trend of educational development, domestic research and practice have been carried out. The postgraduate course Film Theory and Technology of Jilin University has built an integrated intelligent teaching system of "teaching-learning-evaluation-innovation" based on AIGC, forming a promotable intelligent teaching paradigm [9]; Hunan University of Technology has introduced AIGC into the postgraduate course Intelligent Packaging Design, constructed a "intelligent co-creation-oriented" teaching model, and improved postgraduates' creative efficiency and project implementation capabilities [10]; Fujian Agriculture and Forestry University has explored the AIGC-driven path for improving postgraduates' digital literacy education [11]; Qingdao University has conducted a qualitative study on the experience of nursing postgraduates using AIGC tools, and the results show that nursing postgraduates accept AIGC tools to assist scientific research and benefit in independent learning, academic writing and other aspects [12]; Communication University of China has introduced AIGC into the practical course Advertising Creativity and Design, enhancing the creativity of interdisciplinary students [13]. In addition, the application of AIGC technology in postgraduate course teaching also includes intelligent recommendation systems, virtual simulation experiments [14], and assistance in project-based learning and blended learning [15]. However, most of these studies are in the initial stage, and a systematic and replicable teaching model has not yet been formed, and many challenges are still faced in practical application.

In summary, this paper addresses three pain points in the current interdisciplinary education and teaching of postgraduates: first, effectively integrating interdisciplinary knowledge to ensure the comprehensiveness and cutting-edge nature of teaching content; second, enhancing classroom interaction and learning efficiency to ensure the sustainability of learning effects; third, comprehensively and objectively evaluating postgraduates' comprehensive quality and interdisciplinary research capabilities and providing effective feedback. Taking the course Biomass Energy Engineering and Technology as the carrier, this paper constructs an interdisciplinary teaching model based on AIGC technology, providing new teaching ideas and methods for the education of postgraduates in the biomedical field.

2. Construction of the "Four-Wing Intelligent Integration" interdisciplinary teaching model

2.1. AIGC-assisted reconstruction of interdisciplinary teaching content

Using AIGC technology, the interdisciplinary knowledge graph, problem graph, competence graph, and ideological and political graph of the course Biomass Energy Engineering and Technology are constructed to accurately identify and integrate key knowledge points and interdisciplinary fields. Based on the graphs,

teaching content is intelligently screened and generated, including cutting-edge literature, virtual simulation experiments, case analysis, and so on.

2.2. Iterative update of the Chaoxing AI teaching platform

In response to the needs of interdisciplinary education, the Chaoxing teaching platform is optimized, and the AI teaching assistant function of the platform is used to add interdisciplinary course management, personalized learning path planning, and intelligent Q&A functions. Through the platform, in-depth mining and analysis of learning data are realized, providing postgraduates with customized learning suggestions and feedback, promoting resource sharing and academic collaboration, and improving learning efficiency and team cooperation.

2.3. AIGC-assisted flipped classroom

Before class, AIGC technology is used to intelligently push preview materials; during class, intelligent Q&A and real-time interaction tools are used to enhance the depth of discussion and improve participation. After class, personalized consolidation exercises and extended reading are provided to consolidate knowledge, broaden academic horizons, and realize a closed-loop learning process.

2.4. AI intelligent evaluation and feedback

Empowered by AI, a four-dimensional evaluation system of "academic achievements–classroom performance–experimental skills–team cooperation" is constructed to comprehensively evaluate comprehensive quality and interdisciplinary research capabilities. An intelligent evaluation model based on big data and machine learning is developed to automatically analyze learning data and provide objective and accurate evaluation results and personalized feedback.

3. Implementation path of the "Four-Wing Intelligent Integration" interdisciplinary teaching model

3.1. Preparatory work

3.1.1. In-depth analysis of interdisciplinary social demands and student learning status

With the help of AIGC tools (such as Kimi, ERNIE Bot), intelligent analysis is carried out on top journal literatures, industrial reports, and talent recruitment data in the biomedical field to extract the industry's demands for postgraduates' interdisciplinary competence in the current and next five years. At the same time, pre-course questionnaires and knowledge assessments are conducted for enrolled students to draw "competence portraits," providing data support for subsequent personalized teaching.

3.1.2. Evaluation and selection of AIGC educational application tool chain

An evaluation team composed of disciplinary teachers and educational technology experts is set up to conduct teaching applicability evaluation on mainstream AIGC tools. Then, a "hybrid intelligent tool chain" with the "Chaoxing AI Teaching Platform" as the core, integrating professional AIGC tools (content generation) and general large models (inspiration and interaction), is constructed.

3.2. Development of teaching resources

3.2.1. Construction of dynamic interdisciplinary knowledge graph and intelligent reconstruction of teaching content

With the basic knowledge of the course Biomass Energy Engineering and Technology as the core, the knowledge graph function of the Chaoxing platform is used to integrate multidisciplinary concepts such as biochemistry, process engineering, environmental engineering, and policy ethics to build a visual and interactive interdisciplinary knowledge network. On this basis, AIGC technology is applied to realize the "dynamic generation" and "intelligent adaptation" of teaching content.

3.2.2. Iterative upgrading and function deepening of the Chaoxing AI teaching platform

Targeted upgrading of the existing platform is carried out: (1) Adding a "interdisciplinary learning path navigation" module to recommend personalized learning sequences and resource packages based on student portraits; (2) Strengthening the in-depth Q&A and guidance functions of the "AI teaching assistant," enabling it to not only answer factual questions, but also guide students to disassemble complex interdisciplinary problems through Socratic questioning; (3) Developing a virtual "collaborative laboratory" space to support students of different majors to carry out online project conception, data sharing and model collaborative development, and using AI to record the collaboration process to provide a basis for the evaluation of team capabilities.

3.2.3. Functional expansion of the Chaoxing AI teaching platform

The functions of the existing Chaoxing teaching platform are expanded by adding functional modules such as interdisciplinary course management, personalized learning path planning, and intelligent Q&A.

3.2.4. Development of algorithm model for the four-dimensional intelligent evaluation system

In cooperation with the computer professional team, a lightweight machine learning model is designed and trained for the analysis of learning process data. The model aims to: (1) Automatically analyze the integration degree and innovation of interdisciplinary knowledge reflected in academic achievements; (2) Quantify classroom interaction (speech frequency, question quality, etc.); (3) Evaluate the operational norms and problem-solving strategies in virtual simulation experiments; (4) Analyze the role contribution and communication efficiency in team collaboration records. The algorithm model is initially constructed and continuously trained and optimized in practice.

4. Practice and effectiveness of the "Four-Wing Intelligent Integration" interdisciplinary teaching model

4.1. Teacher training

"AIGC Tool Workshop" and "Interdisciplinary Teaching Design Seminar" are held, with training content including designing AIGC-driven inquiry tasks, interpreting AI-generated student learning status reports, and implementing interventions, etc.

4.2. Teaching implementation and optimization adjustment

The "Four-Wing Intelligent Integration" interdisciplinary teaching model is adopted to carry out the teaching reform and practice of the course Biomass Energy Engineering and Technology, and key data and feedback information in the teaching process are recorded.

4.3. Teaching effectiveness

4.3.1. Significant improvement in the quality of students' academic achievements

Blind review scores of final course papers and project reports show that the excellent rate has increased from about 25% in previous years to 43.8%. In particular, the average score of the "interdisciplinary integration degree" index of the papers (scored by two interdisciplinary experts according to the scope of cited disciplines, the degree of method integration, and the comprehensiveness of solutions) has increased by 31.5%.

4.3.2. Great improvement in students' academic communication ability

The "simulated academic conference" session set up in the course requires students to write English abstracts, make posters, and give oral presentations with the assistance of AIGC. Among them, six students successfully gave oral presentations or poster displays at high-level academic conferences and received positive comments from participating experts. Students reported that AIGC tools provided great help in sorting out speech logic and polishing academic English expressions.

5. Conclusion

This paper deeply integrates AIGC technology into the interdisciplinary teaching of Biomass Energy Engineering and Technology, and constructs a "Four-Wing Intelligent Integration" interdisciplinary teaching model for postgraduates, which effectively integrates interdisciplinary knowledge, enhances teaching interaction and personalization, and promotes the explicit development of students' comprehensive quality through an intelligent evaluation system. This model has initially formed a relatively complete operation plan that can be transferred to other interdisciplinary courses of engineering and life sciences, providing a valuable practical paradigm for the digital and intelligent transformation of postgraduate education.

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Disclosure statement

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References

[1] Hong DY, 2022, Accelerating the High-Quality Development of Postgraduate Education and Striving to Cultivate Top-Notch Innovative Talents. China Higher Education, (11): 4–6.

[2] Euchner J, 2023, The Coming Age of Generative AI in Education. Research-Technology Management, 66(2): 10–11.

[3] Li JY, et al., 2024, Research on the Application of AIGC in the Cultivation of Postgraduates' High-Order Cognitive Skills, International Symposium on Educational Technology (ISET), 1–25.

[4] Shi Y, et al., 2023, Research on the Effect of AIGC on Improving the Teaching Efficiency of Postgraduate Courses.

Adult and Higher Education, (5): 9–16.

[5] Zhang Y, et al., 2025, The Impact of Strategic Application of AIGC Tools on the Research Results of Interdisciplinary Postgraduate Projects. Scientific Reports, 15: 25802.

[6] Zhang J, et al., 2020, Construction of Virtual Biology Laboratory Based on AIGC and Its Application in Interdisciplinary Postgraduate Education. Journal of Educational Technology & Society, 23(4): 45–59.

[7] Wang Q, et al., 2021, AIGC-Based Teaching Resources and Their Application in the Cultivation of Postgraduates' Interdisciplinary Competence. Journal of Educational Technology, 18(2): 112–126.

[8] Zhang H, et al., 2023, AIGC-Based Personalized Teaching Reform and Its Effect on Postgraduate Learning. Journal of Educational Technology and Innovation, 19(3): 112–126.

[9] Zhang K, Hou JZ, Wen M, 2025, Research on the Construction of AIGC-Based Intelligent Teaching System for Postgraduate Courses. Technology Wind, (36): 117–119.

[10] He LL, Sun YG, Xie XT, 2025, Research on the "Intelligent Co-Creation-Oriented" Teaching Model of Postgraduate Courses Based on AIGC. Shanghai Packaging, (12): 259–261.

[11] Luo XM, Lin YZ, 2024, AIGC-Driven Research on the Improvement Path of Postgraduates' Digital Literacy Education. Journal of Higher Education, 36(9): 70–77.

[12] Liu T, Yang FG, Yang L, et al., 2024, A Qualitative Study on Nursing Postgraduates' Experience of Using AIGC Tools in Scientific Research. Chinese Journal of Nursing Education, 21(9): 1046–1051.

[13] Dong W, et al., 2024, Application of AIGC in the Cultivation of Creativity of Interdisciplinary Postgraduates in Advertising Major, Artificial Intelligence in HCI, 77–95.

[14] Su WX, Jiang N, Wu HT, 2020, Research on the Application of AIGC Technology in Postgraduate Course Teaching. Contemporary Educational Practice and Teaching Research, (16): 220–221.

[15] Li JK, Zhong L, 2025, Research on AIGC-Assisted Project-Based Learning in Postgraduate Design Courses. Packaging Engineering, 45(S1): 489–493.