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Research and Practice of ChatGPT-Assisted Instructional Design for University Teachers

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Abstract: *With the development of artificial intelligence technology, natural language processing technology has been increasingly widely applied in the field of education. This paper explores how to use the advanced natural language processing model ChatGPT to assist higher vocational college teachers in teaching design and proposes a feasible application framework. Through case analysis, the application potential of ChatGPT in teaching design ideas, teacher lesson preparation, ideological and political education in the classroom, and student interaction is studied. Finally, this paper also discusses the possible challenges in the implementation process and corresponding countermeasures.*

Keywords: *Artificial Intelligence, ChatGPT, Teaching Design, Higher Vocational Colleges*

1. Introduction

Against the backdrop of globalization and informatization, education faces unprecedented challenges and opportunities. On the one hand, the society's demand for talents is becoming increasingly diverse, requiring the education system to cultivate new - era talents with both solid professional skills and good comprehensive qualities. On the other hand, the rapid development of information technology, especially artificial intelligence (AI), provides a powerful technical support for the innovation of educational models. Natural language processing (NLP), as an important branch of AI, its progress has directly promoted the pace of the intelligentization process in the field of education [1].

In recent years, natural language processing models based on deep learning have made breakthrough progress, and ChatGPT is an outstanding representative among them. As a powerful dialogue system, ChatGPT can not only understand complex and changeable human languages but also generate context - appropriate answers according to different scenarios, demonstrating language abilities close to or even exceeding the human level [2]. This feature makes ChatGPT show great application potential in many fields. Especially in the field of education, it can bring revolutionary changes to teachers' teaching design.

For higher vocational colleges, students' vocational skills training and theoretical knowledge learning are equally important. This requires teachers to be proficient in professional knowledge and be good at using various teaching methods to stimulate students' learning interests and improve teaching efficiency. However, in the actual teaching process, teachers often face problems such as tight time and limited resources, making it difficult to fully meet the personalized needs of each student. In this context, introducing ChatGPT to assist teaching has become a viable option. It can not only help teachers save a lot of time spent on data collection and collation but also provide customized learning suggestions and support based on students' characteristics, thus realizing a more efficient and human - oriented teaching process [2 - 3].

This research aims to explore how ChatGPT can be integrated into the teaching design of higher vocational colleges. Through specific case analysis and technical implementation paths, it demonstrates its application value in various teaching links and proposes targeted solutions to the possible problems in the implementation process. It is hoped that through this research, a new choice of teaching aids can be provided for higher vocational college teachers, and it can also provide a reference for the future development direction of educational technology.

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2. Application Research of ChatGPT in Teaching Design of Higher Vocational Colleges

2.1 Teaching Content Design

Teachers can input the course theme and learning objectives, and ChatGPT can generate a preliminary course outline, including the main content, learning key points, and difficulties of each chapter. This process can help teachers clarify their thinking and ensure the logicality and systematicness of the curriculum structure. According to the course content, ChatGPT can propose teaching objectives under the SMART principle (Specific, Measurable, Achievable, Relevant, Time - bound). These objectives will provide teachers with clear teaching directions and help students understand the expected learning outcomes [4]. ChatGPT can automatically retrieve and recommend relevant academic literature, textbooks, videos, and other learning resources according to the course theme. This not only saves teachers' time but also provides students with diverse learning materials to promote autonomous learning.

2.2 Lesson Preparation and Teaching Plan Writing

Teachers can use ChatGPT to quickly generate course outlines, lecture notes, assignments, and test questions, reducing the time spent on lesson preparation and allowing them to focus on the depth and quality of teaching content. ChatGPT can generate video scripts, podcast content, and slide outlines, enriching teaching forms and attracting students with different learning styles. It can provide exercises of different difficulty levels to help students learn in an appropriate challenging environment and enhance learning effects [5]. It can recommend relevant books, articles, and research for specific topics to help students deepen their understanding. By integrating knowledge from different disciplines, it can generate interdisciplinary learning materials to broaden students' horizons. It can provide different teaching strategies and methods to help teachers optimize classroom teaching and meet the needs of different students. ChatGPT can provide the latest research results and educational trends to help teachers update teaching content and methods. By analyzing students' learning data, it can provide targeted resources and suggestions to help teachers improve teaching strategies [6]. ChatGPT can generate multilingual learning materials to help non - native - speaking students better understand the course content. It can provide translations and explanations of professional terms to help students overcome language barriers. It can integrate different types of learning resources to form a comprehensive learning platform for students to easily obtain the required information. It can also recommend external learning platforms, video tutorials, and online courses to enrich students' learning options.

2.3 Classroom Interaction and Student Tutoring

In terms of classroom interaction and student tutoring, the application of ChatGPT can enhance students' learning initiative and participation. Students can ask ChatGPT questions at any time during the learning process and get instant feedback. This quick response can help students correct mistakes in a timely manner and reduce the time spent on repeated learning. ChatGPT can answer various questions that students encounter during the learning process, preventing students from getting stuck due to small problems and improving the continuity of learning. Students can interact with ChatGPT at any time and place for autonomous learning, enhancing their learning initiative and participation [7]. ChatGPT can provide learning strategies and skills to help students manage their time and learning tasks more effectively and improve learning efficiency. ChatGPT supports multiple interaction methods such as text and voice, adapting to the learning habits of different students and enhancing learning flexibility. Through interaction with ChatGPT, students can conduct simulation exercises and case analyses to enhance their practical abilities. ChatGPT can help students discuss and collaborate in group projects, providing suggestions and guidance to promote the cultivation of teamwork abilities [8]. Teachers can use ChatGPT to generate discussion questions to stimulate students' thinking and discussion, enhancing classroom interaction and learning effects. During the learning process, ChatGPT can provide emotional support to help students overcome learning anxiety and stress and maintain a good learning state. It can also help students screen and organize a large amount of information, providing concise answers and learning resources, reducing information overload, and improving learning efficiency. Students can ask ChatGPT to summarize a certain topic to quickly obtain key information and save learning time.

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2.4 Evaluation and Feedback

The curriculum evaluation and feedback mechanism are an important part of teaching design. It aims to understand students' learning effects, the implementation of the curriculum, and the suitability of teaching content through systematic evaluation methods. Using ChatGPT to assist the curriculum evaluation and feedback mechanism can improve the scientificity and timeliness of evaluation and ensure the continuous improvement of teaching quality.

Teachers can use ChatGPT to generate diversified evaluation criteria that meet the curriculum objectives, including aspects such as knowledge mastery, skill application, and thinking ability. By comprehensively considering students' performance, the comprehensiveness of evaluation is ensured. ChatGPT can help teachers design different types of evaluation tools, such as quizzes, questionnaires, project reports, and oral presentations [9]. These tools can be customized according to the course content and learning objectives to ensure the pertinence of evaluation. Teachers can use ChatGPT to generate templates for real - time feedback to help students get timely feedback after completing assignments or participating in classroom activities. This instant feedback can enhance students' learning motivation and promote their further learning. ChatGPT can analyze students' learning data and generate regular feedback reports. These reports can include students' overall performance, the mastery of each knowledge point, and existing difficulties, providing a basis for teachers to adjust teaching strategies [10]. Teachers can use ChatGPT to analyze students' learning data and generate visual learning effect charts. These charts can help teachers intuitively understand students' learning progress and identify knowledge blind spots and learning difficulties. By comprehensively analyzing students' academic performance, participation, and feedback, ChatGPT can provide teachers with curriculum effectiveness evaluation reports. These reports will provide important basis for curriculum improvement and help teachers optimize teaching design. ChatGPT can generate targeted teaching improvement suggestions according to students' feedback and learning data. These suggestions can include adjusting teaching content, improving teaching methods, and adding auxiliary resources, helping teachers continuously improve teaching quality. Teachers can regularly review the curriculum evaluation results, combined with the analysis of ChatGPT, to develop new teaching plans and goals, and establish a feedback - based continuous improvement mechanism to form a virtuous cycle (Figure 1).

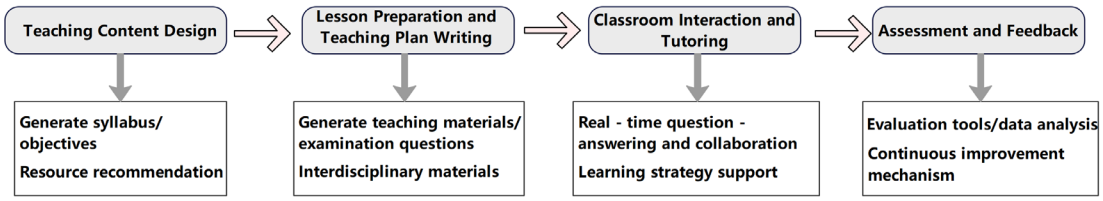

Figure 1: Roadmap for Teachers' Instructional Design with the Assistance of ChatGPT.

3. Practice of ChatGPT Assisting Teachers in Teaching Design

Teaching design is an important concept in the field of educational technology. It refers to the process of analyzing teaching problems and determining teaching objectives using systematic methods based on learning theories and teaching theories, establishing strategy plans to solve teaching problems, trying out solutions, evaluating the trial results, and modifying the plans. In short, teaching design is the process of planning the entire teaching process and learning resources to achieve the best teaching effect. ChatGPT can play a role in curriculum design, classroom teaching, learning evaluation, and other routine tasks, especially with obvious advantages in providing work ideas and organizing teaching materials. Taking the "Pathological Basis" course of the nursing major in Jiangsu Nursing Vocational College as an example, this paper studies the specific practice of ChatGPT in assisting teachers in teaching design.

3.1 Basic Situation of the "Pathological Basis" Course

The "Pathological Basis" is a morphological discipline. Its research content includes the etiology, pathogenesis, pathological changes, and outcomes of diseases. The laws of disease occurrence, development, and evolution revealed by this course are an important foundation for learning clinical medicine. It can provide a theoretical basis for clinically understanding the nature of diseases correctly, explaining clinical symptoms, and judging patients' prognoses. The teaching concept is "student -

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centered, teacher - led", emphasizing the combination of theory and practice, and attaching equal importance to intuitive teaching and practical teaching. Through the guidance of teachers, students' subjective initiative is fully mobilized, their creative thinking is stimulated, so that students can actively acquire knowledge and cultivate their abilities of self - learning, active learning, and lifelong learning. It is advocated that students can use pathological knowledge to analyze, discuss, or make relevant decisions when solving nursing - related problems, providing a connection platform for further learning nursing clinical courses.

3.2 Analysis of the Learning Situation of the Taught Majors

The teaching objects are students in the second semester of the first year of the three - year higher vocational nursing major. Through the study of relevant basic courses such as anatomy and physiology in the first semester, they have some understanding of the basic medical knowledge required for the study of pathology. Students have a strong ability to accept new knowledge, but their proficiency in mastering basic knowledge and their ability to comprehensively analyze using the learned knowledge are poor. The courses they have learned before are all basic medical courses, and the learning focus and thinking mode are mainly based on memory. Since they have not entered the clinical medicine stage of learning, they have not mastered how to use the learned knowledge to solve practical problems, that is, the application - oriented thinking mode has not been established. During the teaching process, it is necessary to explain in combination with common clinical problems as much as possible, pay attention to the connection between basic knowledge and clinical practice, appropriately introduce clinical cases, pictures, videos, etc., gradually reveal the essence of lesions, and stimulate students' learning interests. At the same time, pay attention to cultivating students' autonomous learning ability and critical thinking.

3.3 Practice of Using ChatGPT in the Teaching Design of the "Pathological Basis" Course

The procedure for using ChatGPT in teaching design is as follows: First, clarify the teaching objectives and requirements according to the professional training plan and curriculum standards, and determine the knowledge points that students need to understand. Second, log in to the ChatGPT platform and describe the problems to be solved. Finally, think and study based on ChatGPT's answers or proposed solutions (Table 1).

3.3.1 Providing Teaching Content Design Ideas

ChatGPT can provide teachers with teaching design ideas and better improve the teaching process. For example, by inputting "Please design the teaching ideas for the content of liver cirrhosis in the pathology course for higher vocational nursing majors" in the ChatGPT dialog box, detailed content such as teaching objectives, teaching content, teaching methods, teaching evaluation, and teaching reflection can be obtained, broadening teachers' teaching thinking. Teachers can refer to this information for teaching design during the teaching preparation process, combined with the actual teaching objectives and training plans of the nursing major, to make teaching activities more abundant.

3.3.2 Assisting in Generating Teaching Plans and PPT Outlines

ChatGPT can assist teachers in writing teaching plans and making PPTs. For example, by inputting "Please write a teaching plan for the content of liver cirrhosis in the pathology course for higher vocational nursing majors" in the ChatGPT dialog box, a teaching plan including introduction, basic concepts, etiology, pathological changes, clinical manifestations, and nursing measures can be obtained. For key content, teachers can continue to ask questions to obtain more detailed teaching plan content. In this way, teachers can improve the teaching plan according to the teaching materials, saving the time of writing the teaching plan. Although ChatGPT cannot generate PPTs, it can make PPT outlines and provide design suggestions. For example, by inputting "Please make a PPT outline for the content of liver cirrhosis in the pathology course for higher vocational nursing majors" in the ChatGPT dialog box, a PPT content example about liver cirrhosis can be obtained. Teachers can make PPTs based on this structure and add relevant pictures, charts, and videos.

3.3.3 Generating Typical Cases

In order to cultivate the clinical thinking ability of nursing major students and enliven the classroom learning atmosphere, appropriate cases are arranged for discussion and analysis during the teaching process. ChatGPT can generate typical cases according to requirements. For example, by inputting "Please generate a typical clinical case of liver cirrhosis for higher vocational nursing major students to

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discuss and analyze" in ChatGPT, a typical case including basic information, chief complaint, present medical history, past medical history, physical examination, laboratory examination, diagnosis, and treatment plan can be obtained, along with discussion questions. Teachers can increase interaction through classroom case analysis and discussion, promote students' understanding of knowledge, and timely discover problems in teaching.

3.3.4 Providing Ideas for Ideological and Political Education in the Classroom

Ideological and political education in the classroom is an important way to foster virtue through education. Regarding how to integrate ideological and political content into the pathology course, ChatGPT can provide teachers with ideas for ideological and political education in the classroom according to the teaching content. For example, by inputting "Please design the ideological and political education in the classroom for the content of liver cirrhosis for higher vocational nursing majors" in the dialog box, ChatGPT will provide ideological and political content in aspects such as social responsibility and public health, professional ethics and humanistic care, legal awareness and patient rights, health education and self - management, and teamwork and communication skills. Teachers can select ideological and political content according to the course objectives and effectively integrate ideological and political education into teaching activities.

3.3.5 Developing In - Class and After - Class Exercises

In - class exercises can help teachers understand students' mastery of knowledge points and timely discover and solve problems encountered by students during the learning process. After - class exercises can help students review in a timely manner and deepen their understanding and memory of newly learned knowledge. By inputting "Please design exercises for the teaching content of liver cirrhosis" on the ChatGPT interface, exercises including multiple - choice questions, fill - in - the - blank questions, short - answer questions, and case - analysis questions can be obtained. You can also ask questions according to specific content, such as "Please design multiple - choice questions about the clinical manifestations of liver cirrhosis". This can help teachers timely feedback teaching effects.

3.3.6 Retrieving the Latest Research Progress and Providing Teaching Aids

With the development of society, knowledge and technology in the medical field are updated relatively quickly, and teaching content needs to keep up in a timely manner. ChatGPT can provide the latest research progress and teaching aids. By inputting "The latest research progress of liver cirrhosis", "The latest literature on liver cirrhosis research", "Teaching aids for the content of liver cirrhosis", etc. in the ChatGPT dialog box respectively, teachers can quickly obtain the latest reference literature on teaching content, the latest research progress, and relevant educational platforms and teaching aids. This can save teachers' time in searching and downloading literature and obtain the latest information. If necessary, relevant literature can be intensively read.

Table 1: Practices of ChatGPT in the Course of Pathological Basis.

Practice Module	Teacher Actions	ChatGPT Functions	Output Examples/Outcome	Target
1. Teaching Content Design	Input: "Design a teaching plan for liver cirrhosis (including objectives, methods, evaluation, etc.)"	Provides a structured teaching framework (objectives, methods, evaluation, reflection)	- Learning objectives (knowledge/skills/ideological education) - Suggested teaching methods (case analysis, group discussions)	Expand teaching ideas and refine course logic
2. Lesson Plan & PPT Creation	Input: "Write a lesson plan for liver cirrhosis" or "Design a PPT outline for liver cirrhosis"	Generates lesson plan templates (introduction, pathological changes, nursing interventions, etc.) Provides PPT structure and design tips	- Draft lesson plan - PPT chapter outline (etiology → pathology → clinical manifestations → nursing)	Save preparation time and quickly integrate resources
3. Clinical Case Generation	Input: "Generate a typical liver cirrhosis case (with discussion questions)"	Automatically creates clinical cases (chief complaint, history, examinations, diagnosis, treatment plan)	- Case text with discussion questions (e.g., "How to analyze the cause of abnormal liver function?")	Enhance clinical thinking and classroom interaction

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4. Ideological Education Integration	Input: "Design ideological education content for liver cirrhosis"	Recommends ideological themes (professional ethics, humanistic care, public health, etc.)	- Social responsibility: Liver disease prevention campaigns - Humanistic care: Psychological support for patients	Seamlessly integrate professional and ideological education
5. Exercise Design	Input: "Design classroom/homework exercises for liver cirrhosis (multiple-choice, case analysis, etc.)"	Generates tiered exercises (basic → applied → comprehensive)	- Multiple-choice questions (pathological feature identification) - Case analysis (nursing plan development)	Assess learning outcomes and reinforce knowledge application
6. Update Teaching Resources	Input: "Latest research on liver cirrhosis" or "Recommend literature/teaching resources"	Retrieves and synthesizes recent research (2020-2023) and educational resources	- Latest treatments (e.g., stem cell therapy) - Recommended platforms (e.g., Medline, clinical databases)	Ensure content currency and support teaching innovation

4. Challenges and Countermeasures

4.1 Content Accuracy and Applicability

The content generated by ChatGPT may be inaccurate or not suitable for specific courses, affecting teaching quality. In some professional fields, ChatGPT may not be able to provide in - depth enough knowledge, limiting the depth of teaching. Teachers can screen the content based on their professional knowledge and regularly review and update the content generated by ChatGPT to ensure its accuracy and reliability.

4.2 The Transformation of Teachers' Roles

Teachers need to re - define their roles, changing from knowledge transmitters to learning facilitators. However, teachers may over - rely on AI technology, resulting in a decline in teaching personalization and flexibility, and affecting the interaction and relationship between teachers and students. Teachers need to continuously learn and adapt to new technologies, and educational institutions should provide training for teachers to help them understand how to effectively use ChatGPT.

4.3 Technology Acceptance

Some teachers and students may be reserved about new technologies, affecting the effective application of ChatGPT and preventing the full potential of the technology from being realized. Systematic training can be provided for teachers to help them understand the functions and application scenarios of ChatGPT and enhance their confidence in using it. Provide usage guidelines and demonstrations for students to help them get familiar with how to interact with ChatGPT.

4.4 Data Privacy and Security

When using information technology in teaching design, a large number of students' personal information and learning data are involved. How to ensure the security of these data and prevent leakage has become an important issue. With the introduction of relevant laws and regulations such as the "Personal Information Protection Law", teachers must strictly abide by the regulations when collecting, storing, and using students' data to ensure the security of students' personal information.

4.5 Technical Updates and Maintenance

AI technology is developing rapidly, and teachers need to continuously update their knowledge and skills, which increases the pressure of continuous learning. The maintenance of information technology equipment and technical support are also factors that affect teaching design. If a school lacks a

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professional technical support team, once a technical failure occurs, it is very difficult for teachers to solve it on their own, which may affect normal teaching activities. Educational institutions can establish a dedicated research and development team to continuously pay attention to technological trends and the latest research, and regularly update the system to maintain competitiveness. Provide training and technical support for teachers to help them understand new functions and updates, and improve the usage effect. Although ChatGPT faces many challenges in teaching design, through effective coping strategies, its advantages can be maximized, and the teaching quality and students' learning experience can be improved. The role of teachers, the needs of students, and the rational application of technology are the keys to successful implementation.

5. Conclusion and Prospect

This study explores the application of ChatGPT in the teaching design of college teachers. The research shows that this tool has significant effects in improving teaching quality, enriching teaching content, and promoting students' participation. However, in practical applications, challenges such as teachers' acceptance of technology and insufficient training still need to be paid attention to. Overall, ChatGPT provides new ideas and methods for college teaching design. Future research should further explore the application effects of ChatGPT in different disciplines and teaching environments, and pay attention to its long-term impact on students' learning motivation. At the same time, with the continuous development of artificial intelligence technology, ChatGPT will play an increasingly important role in teaching design, providing strong support for the innovation and development of higher education.

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