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Research on Teaching Practice of Mechanical Courses in Colleges and Universities under the Background of Digital Intelligence

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Abstract: A new wave of digital intelligence technology drives the deep change of higher engineering education, and technologies such as generative artificial intelligence, knowledge map, and virtual simulation provide a new path for mechanical course reform. The local application-oriented college mechanical course has long been difficult to understand the principles of abstraction, the organizational structure is difficult to be visually displayed, the engineering design lacks the real verification scene, and the evaluation method focuses on the final examination and other realistic pain points. Taking the provincial first-class undergraduate course Mechanical Principles and Design as the research carrier, combined with structuralism and situation learning theory, this paper analyzes the current situation and existing problems of the digital intelligence teaching reform of mechanical courses, sticks to the student-centered, output-oriented concept, and carries out the teaching reform practice from the aspects of teaching content reconstruction, digital intelligence teaching space construction, industry-teaching integration resources development, intelligent multiple evaluation system construction, etc. The practice shows that integrating digital intelligence technology into the whole process of course teaching evaluation and management can effectively solve the traditional teaching problems of mechanical courses, improve students' digital design ability and complex engineering problem-solving ability, and provide a reproducible practice model for the transformation of digital intelligence of mechanical courses in local application-oriented universities.

Keywords: Digital Intelligence; AI Facilitator; Knowledge Map; Integration of Production and Education; Mechanical Principles and Design.

1. Introduction to the Project

With the rapid development of new quality productivity, the intelligent manufacturing industry puts forward a higher standard for the digital quality and innovative practice ability of mechanical engineering talents [1]. Higher engineering education must actively meet the needs of industrial change and promote the digital intelligence upgrading of course teaching. Digital intelligence is the product of the deep integration of digital and intelligent. The new technology represented by generative AI, knowledge map, learning data analysis, and virtual simulation is reshaping the college classroom form and bringing opportunities for traditional engineering course reform [2]. Mechanical Principle and Design is the core course of mechanical specialty, undertaking the task of imparting professional knowledge such as mechanism principle, mechanical structure design and parts selection design, etc. It is the key course connecting basic theory and engineering practice, and also the offline first-class course recognized by Hebei Province. Complicated knowledge points of the course, abstract mechanism movement, strong practice of engineering design link, the traditional classroom universally exists the teaching dilemma of "principle difficult to understand, structure difficult to see, design difficult to test". Classroom teaching is dominated by teaching by teachers, and students are difficult to intuitively understand the movement relationship of complex mechanisms; Lack of real engineering case support in course design; The examination and evaluation mainly focus on the final examination, ignore the learning process and ability appreciation evaluation, and there is a certain gap between the talent training output and the actual demand of the intelligent manufacturing industry.

Key universities in China have carried out MOOC and virtual simulation experimental platform construction to realize the digital transformation of teaching resources. However, this kind of construction mode requires high funds and technical team support, and it is difficult for local application-oriented universities to directly implement it. The intellectualization reform of mechanical courses in some engineering universities in the province is mostly limited to the application of single technical tools, only online handling of courseware and exercises, staying on the level of resource digitalization, without completing the systematic reform of teaching mode, course content, and evaluation system, and there is emphasis on technical tools and light on teaching logic; Focus on platform construction and focus on classroom implementation; Practical Problems in Adaptation of Common Resources and Light Machinery Disciplines [3]. Based on the orientation of local universities and the provincial first-class undergraduate course construction foundation, this study explores the deep integration path of digital intelligence technology and mechanical courses, avoiding "technology for technology", and taking teaching practice as the reform core, which has important practical significance for improving the training quality of application-oriented mechanical talents [4].

Taking Hebei University of Water Resources and Electric Engineering's provincial first-class undergraduate course Mechanical Principles and Design as a practical example, this paper explores the path of teaching reform of mechanical

courses under digital intelligence enablement, builds the integrated implementation framework of "technological enabled content restructuring teaching innovation evaluation reform", and provides a reference for the digital intelligence teaching reform of mechanical courses in the same type of local universities.

2. Theoretical Basis and Research Status of Teaching Reform of Digital Intelligence Machine Course

2.1. Core Theoretical Basis

This research takes the constructive learning theory and the situation learning theory as the reform theoretical support. Constructionism emphasizes that learning is not a one-way knowledge infusion by teachers, but a process in which learners actively complete the knowledge construction based on existing knowledge and experience. The digital intelligence tool can create a visual learning situation. The AI teaching assistant and the knowledge map help students to sort out fragmented knowledge points, guide students to complete the establishment of the knowledge system independently, and conform to the learning law of constructionism. Situational learning theory proposes that learning should be placed in real engineering situations, and the learning effect is improved in solving real tasks. Through virtual simulation projects and enterprise real engineering cases, connect classroom learning with intelligent manufacturing industry scenes, so that students internalize mechanical design knowledge in project practice and improve engineering practice ability. At the same time, OBE product-oriented education concept runs through the whole process of reform, and reversely designs teaching contents, teaching activities and evaluation programs with students' learning output as the target, so as to achieve continuous iterative optimization of courses.

2.2. Review of Research Status at Home and Abroad

Digital intelligence technology-enabled higher education has become a domestic education research hotspot [5]. Many scholars have carried out a lot of research on AI integration into classroom teaching, knowledge mapping intelligent course construction, digital and intelligent teaching evaluation, and industry-teaching integration course resource development [6]. Lu Xi proposed to promote the upgrading of intelligent courses by relying on the knowledge map and AI intelligent body, and use the knowledge map to comb the course logic, so that the intelligent body can realize personalized Q&A guidance, and improve the quality and efficiency of classroom teaching [7]. Zhao Xin et al. proposed that teachers in the digital intelligence era need to establish "technology consciousness." Technology application cannot be separated from teaching objectives. Technology is only a tool for teaching reform and cannot be inverted [8]. Zhou Wenye paid attention to the process evaluation of students under the background of digital intelligence and proposed to reasonably use the learning process data, carry out value-added evaluation, and change the evaluation mode of one volume of fixed scores [9]. Some vocational colleges and comprehensive engineering colleges have carried out the digital intelligence course construction practice in electrical, environmental engineering, and other majors, forming a batch of teaching and research results [10].

In the field of mechanical engineering education, the leading universities have invested a lot of resources to build virtual simulation laboratories and online course resources, achieving good construction results. However, this mode is highly dependent on funds and high-end technical personnel, and has poor transplantability for local application-oriented universities. Yanshan University, Hebei University of Technology, and other universities in Hebei Province have strong mechanical disciplines and carry out virtual experiment construction, but most of the reform focuses on single breakthroughs in experimental links and lacks a systematic reform scheme covering the whole process of the course. At present, there is a common phenomenon of "three emphases and three lightnesses" in the practice of digital intelligence in mechanical courses: first, pay attention to technology and light teaching, eager to introduce various AI tools and simulation software, but lack of teaching design adaptability, and technical tools and classroom teaching are separated; second, the reconstruction of light application, a large amount of manpower and material resources to build a resource platform, but the daily use rate in the classroom is low, and there is a lack of teaching practice tests and teaching effect evaluation; third, focus on general science and light science, directly apply the digital intelligence template of other disciplines, and do not develop the targeted teaching program based on the abstract principle, mechanism design, and discipline characteristics of engineering practice of mechanical course.

To sum up, the existing research lays a theoretical foundation for this topic, but there is still room for systematic digital intelligence teaching practice research facing the local application-oriented undergraduate mechanical courses. Based on the existing foundation of first-class courses, combined with the characteristics of mechanical disciplines, the contents, classrooms, resources, and evaluation of each link should be completed to form a set of low-cost, practical, and scalable teaching implementation plan.

3. The Overall Design of Teaching Reform of Mechanical Courses under the Background of Digitalization and Intelligence

3.1. Reform Objective

The reform is divided into three levels: outcome objective, teaching effect objective, and promotion objective. Outcome objective: complete the research report on the status quo of digital intelligence teaching of mechanical courses; develop the digitalized resource package of micro-class video library, project case library, and course ideological and political case library; construct the course knowledge map integrated with ideological and political elements; form the implementation plan and intelligent comprehensive evaluation plan for AI teaching aids; produce one teaching research paper and complete a full practical research report.

Effect objective: implement digital intelligence teaching mode in the pilot class, improve classroom learning experience, significantly improve students' course satisfaction, strengthen students' digital design and mechanical innovation ability, and increase the course objective achievement by more than 10% compared with that before the reform.

3.2. General Idea of Reform

This study adopts the action research model and follows the iterative thinking of "design practice reflection optimization". Comprehensively use a variety of research methods: use the literature research method to comb the relevant theoretical results of digital intelligence education and mechanical teaching reform; Through questionnaires and interviews with teachers and students, the current teaching difficulties of mechanical courses and the status quo of digital literacy of teachers and students are found out; Take the course of Mechanical Principles and Design as a case study; Iterative development of teaching resources and classroom implementation using design-research methods; The teaching platform collects learning data, carries out data analysis methods, combines quantitative statistics and qualitative analysis, and comprehensively judges the reform results.

The overall framework of reform adheres to teaching practice as the core, avoids the abuse of technical tools, and carries out the reform around the teaching, learning, evaluation, and management process. Reconstruct the course teaching contents based on the OBE concept; Build the intelligent teaching space of knowledge map + AI teaching assistant; Cooperate with local manufacturing enterprises to take the road of industry-education integrationation and introduce real project cases of the industry; Establish a comprehensive intelligent evaluation system integrating process data, AI analysis and project results, and complete the intellectualization upgrading of courses.

The implementation of the reform is divided into four stages: the first stage is the preparation design stage, which carries out literature sorting, teachers and students research, and completes the preliminary design of course contents and teaching modes; The second stage is the development and implementation stage, completing the development of various teaching resources, conducting the first round of classroom pilot teaching, and collecting teaching process data; The third stage is the optimization and deepening stage, which reviews the last round of teaching data, corrects resources and teaching design, carries out the second round of teaching practice, and compares teaching results; The fourth stage is to summarize the promotion stage, sort out all research data, write papers and research reports, solidify the reform mode, and complete the project conclusion.

3.3. Analysis of Realistic Reform Difficulties

Before the formal implementation of the reform, through questionnaires and interviews, we conducted research on teachers and students of mechanical majors in our school and some local universities in the province, and found out several practical obstacles to the promotion of digital intelligence reform in mechanical courses.

First, the teaching contents and digital intelligence tools are inadequate. The content system of the original textbook tends to traditional theory and lacks new cases in the intelligent manufacturing industry; fragmentation of knowledge points makes it difficult for students to figure out the logical relationship between mechanism principles and parts design; most of the ideological and political courses are independent of the knowledge points, with a "two skin" phenomenon, which is difficult to be naturally integrated into the whole process of mechanical design teaching.

Secondly, the digital literacy of teachers needs to be improved. Some mechanical course teachers have solid engineering skills, but they have limited understanding of emerging digital intelligence tools such as generative AI and knowledge maps, which are easy to go to two extremes: either they have a resistance to new technologies and refuse to try, or they blindly pursue the new technology, directly use AI instead of classroom teaching, and ignore the course teaching objectives.

Third, focus on form and light application of resource construction. Many universities have already launched a large number of online micro-classand problem banks, but the resources are scattered and not organized in combination with the key and difficult points of the course. The students have no way to get started in the face of massive resources, and online resources and offline classrooms have not formed a linkage.

Fourthly, the reform of evaluation mode lags behind. Most courses still take the final written examination results as the main judgment basis, and the experiment report and course design scores are highly subjective. Due to the lack of data mining for classroom discussion, online practice, simulation practice, and the project work process of students, it is difficult to realize the value-added evaluation of students' ability growth.

Fifthly, constraints of software and hardware conditions in local universities. Local universities do not have sufficient funds to develop large commercial intelligent teaching systems, and cannot follow the construction plan of key universities. The reform plan must take into account practicality and economy, and make full use of the hardware conditions of the existing rain classrooms, super star learning, and simulation laboratories.

4. Teaching Practice Path of Mechanical Principles and Design under the Background of Digitalization and Intelligence

4.1. Standardize the Industry Demands, And Reconstruct the Teaching Contents of the Course Through Modularization and Projects

Based on the OBE education concept and the ability standard of engineers in the intelligent manufacturing industry, the original teaching contents of the Mechanical Principle and Design course are reconstructed, and the construction strategy of "basic principle modularization, core structure visualization, and comprehensive design project" is implemented.

Firstly, disassemble the course knowledge into four teaching modules: mechanism principle module, transmission system module, general parts design module and comprehensive innovative design module. Each module shall specify the corresponding course objectives and engineering ability requirements. Aiming at the abstract and difficult mechanism principles such as crank slider, cam mechanism and gear train, the visual micro-class and 3D animation resources are developed, and the static text illustrations are converted into dynamic demonstration materials, so as to solve the teaching pain point of "difficult structure".

Secondly, carry out the project teaching design, no longer simply teaching theory according to the chapter sequence, each teaching module matches the corresponding engineering practice project. Mechanism principle module completes mechanism motion simulation analysis project; The

transmission module completes the transmission scheme design project of the reducer; Parts module completes shafting structure design check items; At the end of the period, a comprehensive mechanical innovation design project will be set up. Cooperate with intelligent manufacturing enterprises in the province to transform the real simplified engineering tasks of enterprises into course project topics, so as to let students contact the real design requirements of the industry.

At the same time, the ideological and political elements of the craftsmanship spirit, family spirit, and other courses are embedded into the knowledge nodes of the knowledge map, and the cases of heavy machinery equipment in the country are integrated into the project task. Explain gear transmission and introduce domestic major equipment gear localization cases; explain the innovative design and introduce the independent innovation process of domestic mechanical equipment. Realize the organic combination of professional knowledge teaching and value leading, and avoid rigid lectures on ideological and political education.

Use the AI facilitator to dynamically generate personalized homework and expansion design cases according to the students' learning level. Push foundation consolidation exercises for weak foundation students; Learn the extended cases of complicated projects pushed by students with spare efforts to realize layered teaching and meet the learning needs of students at different levels.

4.2. Set up the Course Knowledge Map and AI Assistant Teaching, and Build the Integrated Digital Intelligence Teaching Space

Make full use of the existing online teaching platforms of super star and Rain Classroom, integrate the newly developed micro-class, engineering case library, and ideological and political case library, create the integrated digital intelligence teaching space of Mechanical Principle and Design, and focus on the construction of two core modules: course knowledge map and AI teaching aid.

There are many knowledge points in the course, and the logic is complex. The students often learn each knowledge point dispersedly when studying a complete course, and cannot establish a complete knowledge logic chain. This study clarifies all the concepts, principles, parts, and mechanism types of the course, clarifies the membership relationship, prepositioning, and post-placement relationship between each knowledge point, and establishes the course knowledge map. The knowledge map is presented in visual graphics, and students can intuitively browse the logical relationship between the knowledge points. When students learn the "cam mechanism" knowledge point, the knowledge map can be associated with the front knowledge point "planar linkage mechanism", the rear knowledge point "cam parts design calculation", and the corresponding micro-class, homework, engineering cases, and ideological and political materials. It can be opened to students before, during, and after classes, helping students to sort out the complete knowledge system independently, and facilitating teachers to carry out learning situation analysis.

The AI teaching assistant is oriented to the customized training of the course, distinguished from the general model, and limited to the knowledge base as the teaching content of the course. The AI assistant mainly undertakes three types of tasks: first, Q&A guidance. Students can ask questions about the difficulties of course concepts, formulas, and mechanism design at any time after class, and share the repetitive Q&A work of teachers; Secondly, generating exercises and cases, generating exercises and course design reference cases for different modules; Third, the preliminary diagnosis of learning situation, collection of students' high-frequency error problems, feedback to teachers, help teachers grasp the weak knowledge points of class commonality, and timely adjust the focus of classroom teaching. At the same time, set use specifications to guide students to correctly use AI tools, prohibit directly copying AI output results to complete the homework, and focus on training students to use AI to assist analysis and optimize the digital engineering thinking of the program.

The knowledge map, AI teaching aids and online platform resource library are deeply connected to form a unified teaching space. It does not seek to completely replace offline classrooms, but as a powerful supplement to offline classrooms, so as to achieve online and offline mixed teaching. Pre-study basic concepts with the help of knowledge map; Classroom teachers shall conduct lectures and discussions on key and difficult points, and combine the movement of 3D simulation demonstration mechanism; The AI assistant answers questions after class, completes the project operation, and the platform automatically retains all learning behavior data.

4.3. Deepen the Integration of Production and Education, and the School and Enterprise Cooperate to Develop Digital Intelligence Teaching Resources

The mechanical course reform of local universities cannot be closed to carry out the construction, and the industry real engineering case is an important resource to improve the course practice. The research group cooperated with local intelligent manufacturing enterprises in Hebei Province and took the mode of school-enterprise collaborative resource development. The enterprise engineers provide simplified design cases of real mechanical equipment and equipment failure cases, and the teachers transform the enterprise materials into teaching items and course design topics suitable for classroom teaching.

The enterprise industry data and equipment cases are integrated into the virtual simulation project. The students complete the mechanism motion analysis and component strength check in the simulation environment to solve the shortcomings of traditional teaching "design difficulties". In the course design in the past, students could only draw and calculate on paper after completing the reducer design, and there was no way to verify whether the motion of the scheme interfered and whether the strength met the standard. With the help of simulation projects, students can carry out virtual tests on their own design schemes, see design defects visually, modify the optimization scheme iteratively, and strengthen the awareness of engineering practice.

The integration of production and education is not only used for resource development, but also the enterprise engineers can go into the classroom online to give lectures, introduce the industry's digital design tools and the real needs of intelligent manufacturing posts, break through the barriers between campus teaching and industrial application, and cultivate application-oriented talents suitable for the development of the manufacturing industry in Hebei.

4.4. Construct an AI Comprehensive Intelligent Evaluation System based on Teaching Big Data

Break through the final examination mode dominated by final examinations in the past and establish a panoramic and value-added comprehensive evaluation system integrating learning process data, AI learning situation analysis, and project outcome data. The source of evaluation data is divided into three sectors.

The first part is process learning data: online platform records students' video learning duration, homework questions, classroom interactive discussion, simulation experiment platform operation records, and other process behaviors. The system identifies the learning warning signal, and for students with lagging learning progress and concentrated wrong questions, the AI assistant will push the targeted review resources, and the teachers will timely carry out the intervention reminding to realize the process warning and personalized feedback.

The second part is the AI-assisted learning situation evaluation: the AI-assisted teacher statistics summarize the high frequency of wrong questions in the class, difficulties in centralized questioning by students, and depicts the overall learning situation of the class; For homework and simulation reports submitted by students, AI can complete basic format verification and calculation error screening. Note that AI only provides auxiliary evaluation and does not replace subjective judgment of teachers. Innovation and logical rationality of the project scheme are still scored by teachers.

The third part is the result evaluation data: including experimental reports, course design drawings, simulation project works, mechanical innovation works, and final evaluation results. Comprehensively evaluate the innovation, feasibility and standardization of student engineering design scheme.

Comprehensive evaluation changes the "score only" orientation, focuses on the ability of students to increase their ability in the course of learning, not only to see the score of an examination paper at the end of the period, but also to take into account the multi-dimensional ability of theoretical mastery, simulation practice, and innovative design. At the same time, the evaluation results are fed back to the teaching design. According to the evaluation data, analyze the weaknesses of the course module, continuously iterate the teaching contents and teaching items, and implement the OBE continuous improvement mechanism.

5. Teaching Reform Implementation Effect and Problem Reflection

5.1. Implementation Effect of Reform Pilot

This topic relies on the provincial first-class undergraduate course of Mechanical Principles and Design to carry out two rounds of teaching pilot. The first round of teaching practice will be carried out in the autumn semester of 2026. One teaching class of mechanical specialty will be selected as the pilot class. By applying the knowledge map, AI teaching assistance, and project teaching scheme, the learning platform data, student questionnaires, and interview records will be collected, and the deficiencies in teaching resources and teaching design will be found. The second round of optimized teaching practice will be carried out in spring 2027.

From the subjective feedback of students, the questionnaire survey at the end of the course showed that the students' satisfaction with the course teaching in the pilot class was significantly improved compared with before the reform. Most students think that the knowledge map helps them to figure out the logical relationship of the complex knowledge points in the course, and the three-dimensional visual materials reduce the difficulty in understanding the mechanism principle; the AI facilitator can solve questions after class at any time. The project simulation design task allows me to experience the real mechanical design process and exercise my digital design ability.

In terms of objective teaching data, the course objective achievement of the pilot class is improved by more than 10% compared with the control class; the course design drawing quality and simulation project completion quality of students are significantly improved, and the participation and work quality of students participating in the mechanical innovation contest are improved. Procedural evaluation can identify students with learning difficulties early, carry out teaching intervention in time, and the failure rate of pilot classes is reduced. The research group shall complete the research report, the course digital resource package, and the course knowledge map, form a complete teaching case, output teaching and research papers, and complete the preliminary results of the project.

5.2. Practical Problems Found in Reform Practice

In the process of reform and practice, there are also some practical problems in the implementation process of digital intelligence teaching. First, AI facilitators cannot completely replace teacher instruction. The general large model will have the concept error of mechanical principle, so constraint training must be carried out for the course knowledge base, and the teacher needs to regularly verify the AI output exercises and case contents. AI is suitable for repetitive work such as Q&A and problem generation. Review of complex engineering schemes, value leading and classroom brainstorming and discussion must still rely on teachers. Overreliance on AI must be resolutely avoided to weaken the leading position of teachers.

Second, there is a gap in the digital capabilities of teachers. Some older teachers are slow to master the knowledge map and AI tools, so the school is required to organize targeted teaching training, carry out collective teaching and research, and young teachers and experienced teachers form teaching teams to give play to their respective advantages.

Third, digital intelligence resources need to be updated continuously and dynamically. With the rapid iteration of machinery industry technology, the project case library and project topics cannot be the same. It is necessary to continuously update the industry cases with enterprises. The knowledge map and AI teaching aid knowledge library shall also be maintained with the course reform. The resource construction is not a one-time work, but a long-term continuous work.

Fourth, students should be prevented from generating AI dependency. Some students directly copied AI to generate homework and drawings, and lost the opportunity for independent thinking training. In teaching practice, it must be clear that the positioning of AI tools is auxiliary design, formulate homework and course design assessment specifications, require students to describe the use process of AI, focus on evaluating students' ability to analyze problems,

modify and optimize AI output programs, and guide students to use AI tools rationally.

5.3. Improvement Countermeasures

Aiming at the above problems, the research group puts forward corresponding optimization countermeasures. First of all, adhere to the leading position of teachers in the classroom. Digital intelligence technology is positioned as an auxiliary tool for teaching. Establish an AI output content review mechanism. All cases and problem teachers are pushed to students for pre-review. Secondly, give play to the strength of the course teaching and research team, carry out regular collective teaching and research, carry out digital intelligence teaching tool training, old teachers give play to professional teaching experience, young teachers undertake technical implementation work, and promote reform through team cooperation. The dynamic update mechanism of teaching resources shall be established again, and the project case library shall be updated every year in combination with enterprise research, so as to improve the knowledge map and AI teaching aid knowledge library iteratively. Finally, improve the course homework examination standard, define the use boundary of AI tools, strengthen the process inspection, and incorporate independent thinking and the iterative process into the evaluation indicators to avoid students directly copying AI answers.

6. Conclusion

Digital intelligence brings new opportunities for the teaching reform of mechanical courses in local application-oriented universities, but the transformation of digital intelligence is not equal to simply making courseware and exercises online, nor blindly building various intelligent technical tools. The digital intelligence reform of mechanical courses should be based on the characteristics of disciplines, adhere to teaching practice as the center, take talent training objectives as the starting point, and avoid the misunderstanding of "focus on technology and light teaching".

This paper carries out teaching practice based on the provincial first-class undergraduate course Mechanical Principles and Design. Through the modular project reconstruction of teaching contents, the establishment of course knowledge map and course customized AI teaching assistance, the cooperation of schools and enterprises in the development of engineering teaching resources, the construction of a big data-driven comprehensive value-added evaluation system, and the promotion of the depth of digital intelligence technology into the course teaching evaluation process. Reform practice effectively relieves the teaching pain of traditional mechanical course of "difficult principle, difficult structure and difficult design", and improves students' engineering practice ability and digital quality.

For a large number of local application-oriented colleges and universities in Hebei Province, it is very difficult to replicate the high-investment construction mode of key universities in the digital intelligence construction of mechanical courses, and the existing first-class course foundation shall be fully excavated, and the practical and practical construction route shall be taken. The practice scheme formed in this study can provide a reference for the reform of mechanical courses in similar universities in the province. At the same time, digital intelligence teaching reform is a long-term work of continuous iteration. The subsequent research group will continue to improve teaching resources, expand the scope of pilot promotion, continue to explore the in-depth integration path of artificial intelligence, knowledge atlas, and mechanical engineering classroom, and better serve the training of application-oriented engineering talents in the intelligent manufacturing industry of Hebei Province.

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