Research on Human-Machine Collaboration Mode Based on DeepSeek—A Case Study of Practical Teaching in Modern Educational Technology

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Abstract. This paper takes the Modern Educational Technologycourse as an example to explore the application and practice of a DeepSeek-based human-AI collaborative teaching model in educational reform. As an AI model with powerful natural language processing capabilities, DeepSeek's technical features and application advantages provide intelligent support for education and teaching. This study constructs a student-centered human-AI collaborative teaching model that covers the entire process before, during, and after class. The findings indicate that the DeepSeek-based human-AI collaborative model not only optimizes teaching effectiveness but also serves as an effective pathway to promote personalized and intelligent development in education.

Keywords: DeepSeek, Human-AI Collaborative Model, Intelligent Education

1 Introduction

As an artificial intelligence model, DeepSeek possesses powerful natural language processing capabilities. It can simulate human natural language interaction, providing solid technical support for human-machine collaborative learning. High-awareness learning and human-machine collaboration will offer support for paradigm innovation in higher education and the development of students' critical thinking. [1] This study aims to explore the application of DeepSeek as an intelligent learning tool in teaching, so as to provide diversified learning methods and personalized learning support.

In the teaching of the Modern Educational Technology course, DeepSeek is applied in intelligent tutoring, teaching assistance, and teaching material generation to deliver more intelligent and personalized teaching services and learning support. This helps enhance students' learning experience and practical skills. During the teaching implementation, the principle of "progressive advancement from simplicity to complexity" is emphasized, and a blended teaching model of "independent + cooperative learning" is adopted. This transforms the classroom into a digital "experience center" and realizes a student-centered training model.

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2 DeepSeek Application Advantages

DeepSeek's key characteristics are reflected in its technical features and application advantages, enabling it to provide users with more comprehensive and efficient services.First, the functional interface is clear. The DeepSeek platform features an extremely simple interface design that organically integrates core functions such as interactive Q&A and multimodal generation. Users can efficiently complete diverse tasks within the same interface, significantly lowering the barrier to use.Second, the service forms are diverse. DeepSeek offers a full range of access methods: the web version provides instant usability, the mobile app allows access anytime and anywhere, and the API interface enables deep integration for developers. Among these, the platform's innovative "Deep Thinking" mode can solve complex problems, while the "Connected Search" function ensures the timeliness and accuracy of information.Finally, the application scope is broad. DeepSeek's dynamic knowledge distillation mechanism presents a situation of low-cost and high-efficiency deployment, allowing it not only to provide personalized learning analysis and intelligent tutoring in the field of education but also to deeply empower multiple vertical industries such as content creation, customer service, and medical consultation. [2] This cross-domain functional adaptability makes DeepSeek a powerful assistant for digital transformation across various industries.

3 Human-Machine Collaboration Model Based on DeepSeek

Modern Educational Technology is a highly interdisciplinary, comprehensive, and applied course. Its teaching objectives are: to help students understand learning and teaching concepts in the information age; master the connotation, functions, and theoretical foundations of educational technology; comprehend the basic principles and operation methods of various teaching media; deeply understand and master informational teaching design; design, develop, implement, manage, and evaluate the processes and resources of teaching and learning; and finally, apply modern educational technology to optimize the teaching and learning of professional courses, explore teaching reforms, and promote personal development. In the traditional teaching of Modern Educational Technology, teachers usually first introduce basic concepts such as educational technology, teaching media, and multimedia; then explain the corresponding learning theories of modern educational technology, teaching design, and teaching resource development theories; and finally cover the application of teaching design. However, this teaching model has problems such as low student interest and initiative, rapid knowledge update and iteration, and insufficient practical opportunities.[3]

To address these issues, based on the latest research and application achievements of multimedia technology and artificial intelligence technology, this study adopts DeepSeek as a teaching auxiliary tool to conduct up-to-date theoretical and practical explorations in teaching and learning, including reforms in teaching concepts and methods. The human-machine collaborative teaching mode based on DeepSeek is shown in Figure 1.

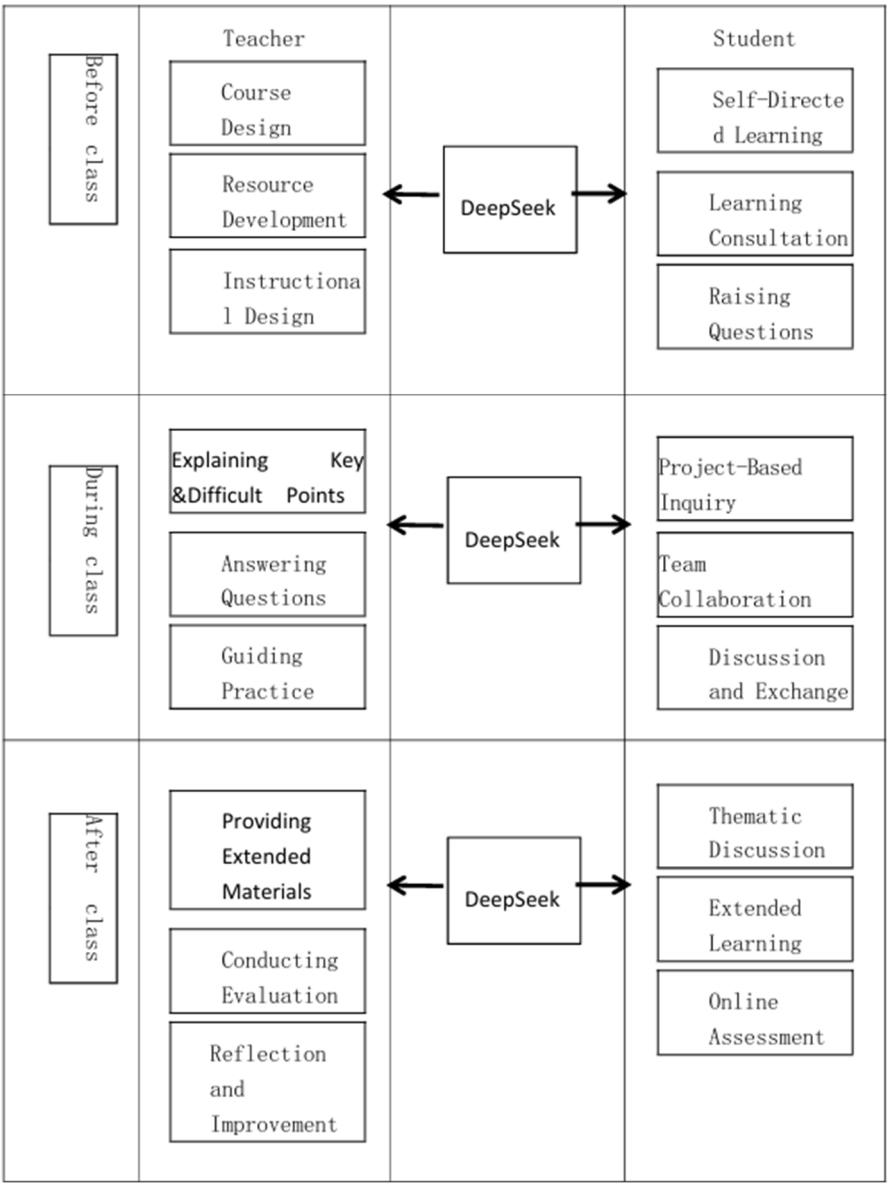

Fig. 1. The Human-AI Collaborative Teaching and Learning Model Based on DeepSeek

4 Human-Machine Collaboration Model Based on DeepSeek

This model adheres to a student-centered approach, emphasizing students' independent learning and collaborative learning, while focusing on leveraging the role of teaching.

Guided by connectivism learning theory and constructivist learning theory, it takes DeepSeek technology as an entry point and aims to fundamentally transform students' learning methods. Students shift from being passive recipients of knowledge to active seekers of knowledge, requiring them to proactively understand what knowledge can solve practical problems.The Modern Educational Technology course introduces real-world course projects, encouraging students to apply the theoretical knowledge they have learned to these real-world projects, thereby enhancing their ability to solve practical problems.

The instructor teaches theoretical knowledge of modern educational technology in the classroom, while encouraging students to use DeepSeek as a teaching aid to actively expand upon and summarize the related knowledge taught in class, followed by in-class sharing and discussion. The instructor compiles and comments on the content shared and discussed by students. This not only helps students use DeepSeek as a teaching aid to purposefully summarize key course points and internalize them as their own knowledge but also promotes the instructor's teaching content to keep pace with the times, helps expand the instructor's knowledge scope, and thereby improves teaching quality and effectiveness. [4]

5 Teaching Practice of Human-Machine Collaboration Mode Based on DeepSeek

By applying DeepSeek in intelligent tutoring, teaching assistance, and teaching material generation, more intelligent and personalized educational support can be provided for teachers and students, thereby enhancing teaching experience and learning effects. In the teaching process—including pre-class knowledge organization, in-class interaction, post-class final project assignments, and peer evaluation of assignments—conversational AI such as DeepSeek is used in combination with project-based learning and collaborative learning. This provides more intelligent and personalized teaching services and learning support, improves students' learning experience and practical skills, and realizes a student-centered training model. [5]

5.1 Application of DeepSeek Before Class

DeepSeek can assist teachers in material preparation, plan formulation, and teaching method optimization. As a conversational robot based on a large corpus, DeepSeek can organize existing materials and prepare course materials according to the characteristic materials provided by teachers, helping teachers complete basic lesson preparation.

In the Modern Educational Technology course, pre-class knowledge point review is an important learning step for students, as it can help them quickly grasp relevant knowledge points and concepts.Through DeepSeek, we can automate the organization and structuring of knowledge points, providing corresponding explanations and support.For example, DeepSeek can automatically extract and classify theoretical

knowledge points of modern educational technology, and provide corresponding answers and explanations. This assists students in self-directed learning of the knowledge before new lessons, and allows for in-depth exploration of any confusing concepts. [6]

5.2 Application of DeepSeek During Class

In classroom teaching, according to the key and difficult teaching points, teachers can use DeepSeek to assist in project division of labor and the design of driving questions, thereby promoting the efficient progress of teaching. DeepSeek can analyze data to predict potential risks and dynamically adjust driving questions based on these analysis results, effectively guiding students' inquiry activities.

In classroom interactions, students encounter various questions and difficulties that require timely solutions and support. DeepSeek can provide automated responses and assistance for students'questions. For example, through a conversational interface, students can input questions like "What is the core problem that instructional design needs to solve?" DeepSeek can automatically extract and categorize relevant knowledge points and application scenarios, providing corresponding answers and explanations. For instance, when asked how to complete the production of a micro-lecture on "The Sight of Father's Back," DeepSeek can offer specific code examples and detailed implementation steps to guide students through the creation process. [7]

5.3 Application of DeepSeek After Class

DeepSeek can participate in two core links of teaching evaluation: the evaluation of teachers' teaching work and the evaluation of students' learning effects.With sufficient data support, DeepSeek can serve as a teaching partner for teachers, conducting comparative evaluation of lesson plans. [8] This allows teachers to obtain peer-like references even without peer discussions, identify gaps, and receive suggestions for revising teaching design and implementation. Combined with self-reflection, this helps teachers improve their teaching.DeepSeek can provide students with real-time and targeted evaluation. With its system generation capability, DeepSeek can conduct process-based recording and evaluation of students' learning. At the same time, its content generation capability enables it to provide objective comments on students' assignments, along with targeted revision suggestions and demonstration references. This helps students obtain more guiding and targeted evaluation. The evaluation is visible to students, allowing them to intuitively understand their learning status and make timely adjustments and improvements. For example, in final project assignments, students can first ask DeepSeek to draft a report outline to clarify their thinking.

5.4 Feedback from Teaching Practice

In the teaching practice of the "DeepSeek" course, instructors designed a questionnaire from three perspectives: assisting with theoretical knowledge acquisition, supporting course project completion, and enhancing students' active learning abilities. The following feedback was obtained:

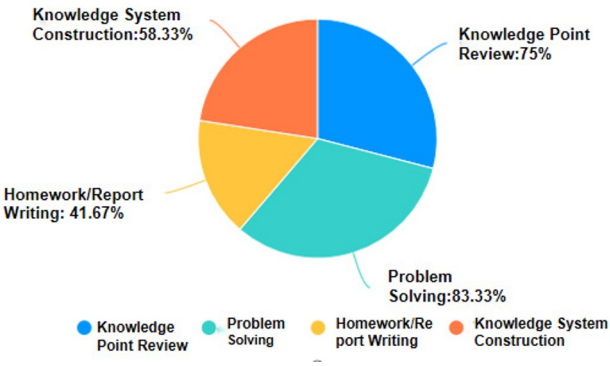

Fig. 2. Summary of Questionnaire on DeepSeek's Effectiveness in Assisting Theoretical Knowledge Learning

From the perspective of assisting students in learning theoretical course knowledge, as shown in Figure 2 data, DeepSeek's performance as a teaching aid in theoretical knowledge learning is as follows:83.33% of students believe that using DeepSeek as a teaching aid helps to answer questions and resolve doubts.75% of students think it helps them quickly grasp course theoretical knowledge points and their connections, thereby improving learning efficiency and effectiveness.58% of students believe DeepSeek can better help them construct a systematic knowledge framework of the course.Based on the above data, it can be concluded that using DeepSeek as a teaching aid can effectively assist students in learning theoretical course knowledge.

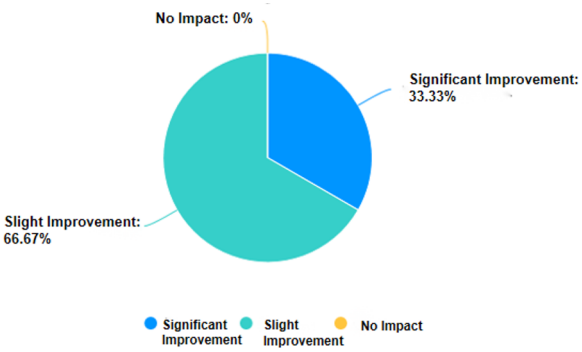

Fig. 3. Summary of Questionnaire on DeepSeek's Effectiveness in Supporting Course Project Completion

From the perspective of course project completion, as shown in Figure 3, the combined percentage for "Significantly Improved" and "Slightly Improved" is 100%. This data show that the vast majority of students highly affirm the use of DeepSeek for completing course projects. This is first reflected in a leap in project development efficiency. In the traditional model, students spend significant time on basic information

retrieval and content organization for tasks like project conception, literature review, code writing, or report drafting. DeepSeek can quickly respond to student queries, providing project ideas, outlining technical frameworks, generating code examples or report outlines, and even enabling multiple rounds of iterative optimization. This allows students to focus their precious time and energy more on in-depth thinking about core issues, innovative design, and practical verification, significantly shortening the project cycle and making the overall learning rhythm more compact and efficient.

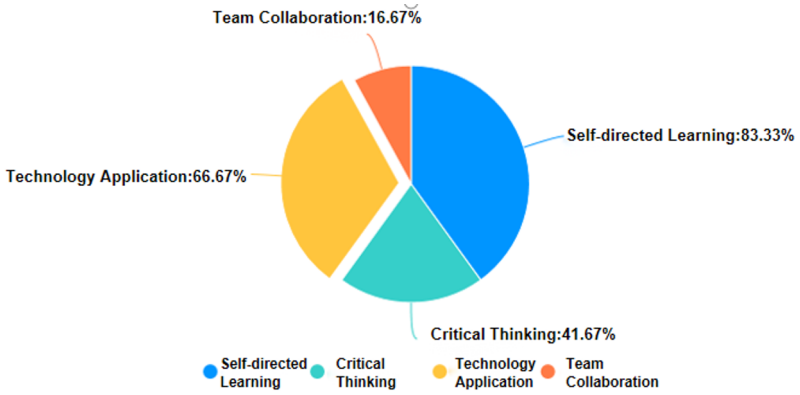

Fig. 4. Summary of Questionnaire on the Effectiveness of DeepSeek in Cultivating Abilities

Analyzing the effectiveness in cultivating abilities, as shown in Figure 4, strongly proves the core value of DeepSeek in teaching—it is not just a tool but also a "catalyst." Independent learning accounts for over 80%. The traditional "teacher-instruction, student-reception" model easily places students in a passive state. The introduction of DeepSeek constructs an active learning loop: "student actively asks questions - AI provides immediate feedback - student critically verifies and deepens understanding." In this process, to complete the project, students must learn how to pose precise and clear questions to the AI, which in itself is a form of high-order training in problem definition and decomposition skills. After receiving AI feedback, students need to use their acquired knowledge for critical thinking—discriminating and judging the information rather than accepting it wholesale. They need to think: "Is this the optimal solution? Are there boundary conditions not considered? Is there a more innovative approach?" This interaction with AI greatly exercises students' independent inquiry and metacognitive abilities. They transform from passive recipients of knowledge into active planners of projects and leading problem-solvers. Cultivating these abilities is far more important than mastering isolated knowledge points and represents the core goal pursued by modern education.

In summary, based on the feedback data from this teaching practice, the use of DeepSeek for project-based learning in the classroom has significant and positive educational effects. It has achieved immediate results not only in improving efficiency and the quality of outcomes but, more importantly, has demonstrated great potential in promoting active learning and cultivating higher-order thinking and problem-solving skills.

6 Conclusion

This paper, using the Modern Educational Technology course as an example, explored the application of the DeepSeek-based human-AI collaboration model in teaching reform. This model provides new ideas and solutions for education, promising to propel teaching and learning towards more personalized, diverse, and intelligent development. In the future, there remains much potential to be tapped in the DeepSeek-based human-AI collaboration model. For instance, DeepSeek technology could be integrated with Virtual Reality (VR) and Augmented Reality (AR) technologies to provide students with more immersive learning experiences. It could also be combined with blockchain technology to offer students a more secure and trustworthy learning environment. With the continuous development of artificial intelligence technology, we have reason to believe that in the near future, the DeepSeek-based human-AI collaborative learning model will play an increasingly important role in the field of education and teaching. It will bring more possibilities and opportunities for teaching reform, driving education towards a more intelligent, innovative, and comprehensive direction.

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