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In-depth Research on the Application of Large Models in University Teaching

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Abstract

With the continuous emergence of large AI models such as ChatGPT, large models are rapidly driving development and transformation across various fields. This paper mainly studies the application of large models in higher education teaching, using specific examples to analyze the current ways in which large models are applied, and discusses the core differences between shallow and deep applications of large models, exploring how large models can be deeply applied in higher education teaching. The research shows that at present, large models are still at the stage of being auxiliary tools and have not changed the existing methods of higher education. However, with the deep application of large models, the current teaching methods will be reconstructed. In the future, using a fusion architecture of vertical large models, knowledge graphs, and intelligent agents as support, vertical large models can provide more accurate educational services through knowledge construction. Knowledge graphs organize knowledge in a structured manner. Intelligent agents can make teaching more proactive. The collaboration of these three elements will lead higher education towards a new ecosystem..

Keywords

Large models; higher education; knowledge graph; intelligent agents.

1. Introduction

In January 2025, the Outline of the Plan for Building a Strong Education Nation (2024-2035) was officially released, clearly proposing to 'promote the use of artificial intelligence to assist educational transformation.' As of August 2025, 125 'Double First-Class' universities nationwide have completed the localized deployment of large models such as DeepSeek, with applications showing trends of scale and systematization[1]. This article starts from the comparison between 'current applications' and the 'new ecosystem of deep applications' to explore the evolution logic of large models in university teaching.The characteristics of traditional embroidery art.

2. Analysis of the Current Application of Large Models in Teaching

At present, the application of large models has permeated various aspects of teaching, but it is still limited to single-aspect auxiliary teaching stages. For example, teachers use large models to assist in lesson preparation before class. The true advantages of large models have not yet been fully realized by integrating them into all aspects of higher education teaching. Overall, the current large models have not yet fundamentally changed the model of higher education teaching based on their core advantages.

(1) Analysis of Pre-Class Applications

Intelligent agents actively assist teachers in setting clear learning objectives, generating courseware content, preview micro-lessons, and other teaching resources, and comprehensively summarizing students' preview status to provide feedback to teachers,

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offering strong data support for smooth teaching activities. For example, the "Zhixing Banxue" intelligent agent at Northeastern University can provide teachers with references for lesson plan design and suggestions for integrating ideological and political education into courses. It can comprehensively assist teachers in pre-class preparation work.

(2) Analysis of In-Class Applications

The classroom teaching process is the most critical stage of the entire teaching phase. Taking China Agricultural University's "Shennong Baixiao" as an example. First, there is the intelligent Q&A and classroom interaction section. "Shennong Baixiao" can accept students' questions and provide precise answers, while also expanding on the questions to help students quickly understand and master related knowledge. Second, in terms of image interaction, students can upload photos of field crops, and teachers can have the model analyze disease types in real-time, achieving "classroom-field" linked teaching. Finally, "Shennong Baixiao" also supports character intelligent agents. Through this agent, it can recreate the real appearance of relevant predecessors for students to have cross-temporal dialogues, enhancing ideological and political education and students' professional identity[2].

(3) Analysis of Post-Class Applications

Taking Xidian Intelligent Evaluation (Xi'an University of Electronic Science and Technology's Engineering Intelligent Evaluation Large Model) as an example: 1. Assisting in intelligent grading of homework: Automatically grades post-class assignments assigned by teachers and can provide scores and identify errors instantly.2. Automatic grading of code/experiment reports: The programming experiments conducted by students during class can be monitored and optimized suggestions can be provided.3. Analysis of learning feedback and weak point recommendations: The large model can automatically push micro-lessons or exercises on weak knowledge points based on each student's grasp of the lesson content.4. Process evaluation records: This large model can record the status of homework assigned by teachers, ultimately creating a semester-long learning archive, allowing teachers to understand each student's proficiency and analyze overall learning outcomes at the end of the semester.5. Personalized review paths: The large model can create customized review plans based on each student's learning performance in each class, achieving tailored instruction.

(4) Analysis of Extracurricular Applications

Taking Xi'an Jiaotong University · Jiaoxiao Smart Large Model as an example. This platform can provide relevant assistance to extracurricular teaching from five aspects. First, it offers 24-hour personalized Q&A, providing precise answers to students' questions from their courses. Second, it allows for the creation of custom intelligent agents. Both students and teachers can create their own personalized agents to accurately help teachers or students complete course work. Third, it offers research assistance, enabling literature retrieval, summarization, and the generation of research paper frameworks through the platform. Fourth, it provides capability profiling, similar to user profiling. It can summarize a student's overall learning level based on their study situation, covering learning abilities and knowledge weaknesses. Fifth, project-based learning. For example, if students are learning a programming course, the platform can provide corresponding projects for students to follow and learn step by step [3].

3. The Connotation and Related Technologies of In-depth Application

(1) The difference between shallow application and deep application

At this stage, the application of large models is basically limited to the shallow application stage, and compared with the deep application, they have the following differences: 1. The teaching positioning is different. At this stage, in the teaching process of colleges and universities, teachers generally use large models as auxiliary tools, and in-depth applications should

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complement each other, and teachers and large models jointly empower the teaching process. 2. The teaching logic is different, and at this stage, college teaching is still dominated by teacher teaching, and the in-depth application should reflect human-machine collaboration[4]. 3. The organization of knowledge is different, and the knowledge organization method of teaching at this stage is fragmented, not coherent, and needs to be summarized by oneself. The in-depth application is more comprehensive and relevant in the form of a knowledge graph. 4. The learning path is different, the previous learning path is carried out by the school's unified training plan to carry out education and teaching work, and the in-depth application is reflected in dynamic generation, according to students' different ability levels, interests and hobbies and other factors, dynamically formulated. 5. The relationship between teachers and students is different. With the in-depth application of large models, the relationship between teachers and students has also changed. With the more in-depth application of large models, the relationship between teachers and students is reflected in a new model of "human-machine-human". In general, the current stage of large model application has not changed the teaching model of "teacher-led, student-accepted". According to research by Northeast Normal University, this application is still in the stage of "instrumental support" and has not yet achieved "procedural embedding".

(2) Technical support for in-depth application

From shallow to deep is an inevitable path of technological evolution. Existing practice has shown that the application of general-purpose large models to higher education has many shortcomings: 1. Insufficient accuracy of professional knowledge: There is a structural misalignment at the data level in the educational scenario of general-purpose large models, and the corpus in the field of vocational education is scarce and unstructured, making it difficult to accurately understand industry terminology and workflows[3]. 2. Fragmentation of knowledge structure: General large models lack a deep understanding of structured knowledge, resulting in fragmented knowledge. 3. Passive interaction mode: Existing LLM applications are mainly passive responses, lacking goal planning and active intervention capabilities. Therefore, the fusion architecture of vertical large model + knowledge graph + agent can effectively solve the above problems. 1. Vertical large model: Vertical large model can focus on teaching and scientific research scenarios, and realize professional accurate, rigorous and reliable, and intelligent services that adapt to educational needs by strengthening core capabilities such as multi-modal understanding generation, knowledge construction, logical reasoning and content security. 2. Knowledge graph: Knowledge graph is a structured semantic knowledge base, which represents entities, concepts, attributes and their interrelationships in the real world in the form of nodes + relationships + edges to form a network of knowledge structure. It can effectively solve the fragmented self problem.3. Intelligent agents: turn large models into our learning partners, transforming passive acquisition into active planning. They provide a more realistic way of interaction. The collaboration of the three constitutes the technological essence of deep applications.

4. A New Ecology of in-depth Application

(1) Characteristics of the new ecology

Different from the current stage of large model embedded in every link of teaching, the new ecology has been reconstructed from several aspects: teaching logic, teacher-student relationship, and knowledge organization. Specifically, there are three characteristics. First, teaching logic. From the previous experiential teaching to the current personalized teaching. No longer use results as the criterion for judging teaching effectiveness, but from diversified criteria to make each student have more personalized abilities. Second, the transformation of the teacher-student relationship. In the new ecological teaching environment, teachers are no

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longer teachers, but more like designers of teaching, and students can also change from recipients of knowledge to active inquirers. Technology has given teachers and students new abilities and roles, and has become their collaborative partner. Third, in terms of knowledge organization, the knowledge graph can organize fragmented knowledge, no longer with the curriculum as the core, and become a new teaching center.

(2) The prototype of the new ecology

As a pilot unit for the reform of teacher education innovation mechanism, Northeast Normal University takes the teacher education model as the traction to build an ecological circulation system with vertical large model, smart teaching platform, and multi-agent hierarchical linkage. The system uses the concept of "knowledge + cognition" to build a hybrid expert large model architecture that integrates the "teacher education DNA" capability map. Build a more than 10T education data platform, develop a large model of teacher education and a multi-agent system, and build a smart teaching platform covering the whole process. This practice promotes the transformation of teacher education to student-centered, ability improvement, and digital intelligence-driven, serving tens of thousands of people on the platform, with a diagnostic report adoption rate of 76% and a satisfaction rate of 92%, providing a new path for the construction of high-quality teacher education [5].

(3) Challenges faced by the new ecological challenge

Since the application of large models is still in the exploration stage at this stage, the new ecology of human-machine collaboration still faces many challenges. First of all, large models may produce incorrect content. At this stage, the large model is not completely a jack of all trades and cannot fully give us accurate results. Secondly, teachers' over-reliance on large models may lead to a decline in teachers' own teaching ability and personal knowledge reserves. Therefore, the development of new ecology needs to clearly divide the boundaries of human-machine collaboration. Finally, privacy and security issues. In today's Internet age, information security has always been a common problem faced by society. In today's promotion of new ecological development, it is especially necessary to pay attention to the issue of privacy and security. Therefore, it is still key to strengthen the concept of individual and collective privacy protection and continue to strengthen the construction of data governance system [6].

5. Conclusion

In today's era of artificial intelligence development, the application of large models is gradually changing the teaching modes of modern higher education. The technological transformation of higher education, driven by large models, is evolving from an auxiliary tool to a new form of human-computer collaboration. The deep application of large models should be supported by an integrated architecture combining vertical large models, knowledge graphs, and intelligent agents, enabling technology to ultimately better serve education. In the future, supported by large models, higher education should place greater emphasis on cultivating individual personalities and, through diversified training methods, achieve a new educational ecosystem of human-computer collaboration.

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