

Exploration and Practice of General Education Course on AI Large Models for Graduate Students in Local Universities

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Abstract

General education in artificial intelligence has become a new proposition for talent cultivation in universities, which is a key initiative promoted by the Ministry of Education. Yanshan University has actively responded to this by collaborating with Zhipu AI to conduct exploratory and practical studies on general education courses on AI large models for all master's and doctoral students across the university in 2024. This paper analyzes the pain points in graduate education in local universities, formulates a top-level design scheme for general education courses on AI large models for graduate students, and elaborates on the resource development and course implementation at Yanshan University. Through an analysis of the implementation outcomes, it is preliminarily verified that the training model based on this scheme can effectively enhance graduate students' awareness of interdisciplinary studies, innovative thinking, and research efficiency.

Keywords

AI Large Models, Graduate Students, General Education, University-Enterprise Integration

1. Introduction

Currently, China is actively promoting general education in artificial intelligence to cultivate new talents who can meet the needs of future social development. In January 2024, Minister of Education proposed the implementation of the "AI+" empowerment action at the World Digital Education Conference, aiming to promote the deep integration of intelligent technologies with education, teaching, and

scientific research. In September of the same year, the Beijing Municipal Education Commission issued an official document requiring all municipal universities to offer general AI courses. In December 2024, Vice Minister of Education Wu Yan proposed the development of a general AI course system at the World MOOC and Online Education Conference.

As the highest level of the higher education system, graduate education emphasizes the cultivation of students' ability to conduct scientific research. Through in-depth study in specific disciplines, students acquire advanced theoretical knowledge (including Computer Artificial Intelligence and Mathematics) and practical skills (Chen & Zheng, 2017; Choi & Shim, 2024). However, there are currently pain points in the research process of graduate students in various disciplines in local universities, such as weak interdisciplinary awareness, failure to keep up with cutting-edge research, and insufficient programming skills.

AI has attracted global attention and sparked a wave of research and development (Black & Tomlinson, 2025; Gui, 2024; Xu, 2024; Zhang et al., 2023). Especially, ChatGPT has revolutionized human-computer interaction by enabling interaction through natural language (Otero, 2024). Large models function like super-brains, supporting multi-round dialogues and allowing in-depth discussions on professional topics across various fields. They are proficient in multiple languages, capable of smooth translation, summarization, and drafting various practical documents. They are also familiar with multiple programming languages, assisting in programming, code debugging, and completion. Their complex reasoning capabilities are also gradually improving, enabling logical reasoning in mathematics and other fields through chain-of-thought methods.

Large models have significantly enhanced the depth of AI's understanding and processing capabilities, becoming a new milestone in AI development and an engine for interdisciplinary innovation across various fields. For example, the AlphaFold2 model successfully solved the protein folding problem that had plagued the field of biology for more than half a century, earning the 2024 Nobel Prize in Chemistry. Therefore, AI large models provide a new approach to addressing the pain points in graduate education in local universities.

The research and application of AI large models in China have developed rapidly, giving rise to outstanding products such as Huawei's PanGu, Alibaba's Tongyi, Baidu's Wenxin, Tencent's Hunyuan, and Zhipu AI's ChatGLM. These have become the core driving forces behind the formation of new productive forces. Among them, ChatGLM, jointly developed by Tsinghua University and Beijing Zhipu Huazhang Technology Co., Ltd. (short for Zhipu AI), is a large model with fully independent intellectual property rights in China. It is comparable to OpenAI's GPT series and focuses on Chinese innovation in large models, being a leading next-generation cognitive large model in China.

Using domestic large models to empower higher education in China not only helps to promote the digital transformation and intelligent upgrading of the education sector but also plays an important role in cultivating innovative talents to

meet the needs of the new era, promoting educational equity, and ensuring data security. Therefore, Yanshan University has opened general education courses on AI large models for graduate students of all types based on Zhipu AI's large model platform, conducting preliminary explorations into using AI large models to empower graduate education and teaching.

2. Pain Points of Master's and Doctoral Students in Research Projects

2.1. Failure to Keep Up with Cutting-Edge Research

When conducting research, graduate students need to stay abreast of the latest developments in their fields. Due to the vast amount of information, the difficulty of manually screening it, or the lack of effective information analysis tools, many graduate students often struggle to keep up with and fully grasp the latest research trends. This may cause their research to lag behind their peers, making it difficult for them to gain an advantage in research competitions. Failure to keep up with cutting-edge research may also lead to imprecise choices of research directions and methods, affecting the innovation and practicality of research outcomes.

2.2. Low Efficiency in Reading and Writing Papers

Graduate students need to read a large number of relevant literature and write papers during the research process. However, many graduate students lack efficient screening and summarization skills when reading literature, leading to low reading efficiency. In terms of writing, due to the lack of systematic writing training and clear logical thinking, graduate students often face issues such as unclear structure and inaccurate expression when writing papers, further reducing the efficiency and quality of paper writing.

2.3. Weak Computational Thinking and Programming Skills

Computational thinking is one of the essential skills for modern researchers, involving problem abstraction, model building, and data analysis. However, many graduate students lack training in computational thinking, mainly due to limitations in their educational backgrounds or the lack of systematic training. In addition, in many research fields, programming skills are the foundation for data analysis and simulation experiments. Currently, due to the lack of systematic programming training or familiarity with programming tools, many master's and doctoral students have weak programming skills. The lack of computational thinking skills affects graduate students' ability to process data, build models, simulate experiments, develop software, and solve problems, thereby limiting the depth and breadth of their research work.

2.4. Weak Awareness of Interdisciplinary Innovation

Interdisciplinary innovation refers to the integration of knowledge, technology, and methods across different disciplines to produce new research outcomes. If graduate

students lack awareness of interdisciplinary innovation, they may be confined to their own professional fields and find it difficult to discover new opportunities for cross-disciplinary research. This limitation may restrict the innovation capabilities of graduate students and the breadth of their research outcomes.

3. Top-Level Design Scheme for General Education Courses on AI Large Models for Master's and Doctoral Students

3.1. Teaching Goal Design

This general education course focuses on AI large models, a disruptive and cutting-edge technology. By introducing the development history, technical principles, personal applications, industrial applications, and future prospects of AI large models, it aims to help students understand the frontier technologies of information technology development in the era of intelligence and broaden their horizons. Through an understanding and use of domestic large model technologies such as ChatGLM and large model products such as “Zhipu Qingyan”, students can significantly improve their work and learning efficiency, using AI to assist in achieving their research goals.

Specific teaching goals are as follows:

- **Knowledge Goals:** To understand the development history of AI, the theoretical basis and basic principles of large model technology, as well as the characteristics, application areas, and future prospects of current classic large models, thereby broadening students' horizons.
- **Skill Goals:** To master the use of the domestic large model product “Zhipu Qingyan” and proficiently use the intelligent Q&A, text-to-image, and intelligent agent functions of ChatGLM. Students should learn to use the “prompt” method and its techniques, leverage AI to empower and significantly improve their research, learning, and office efficiency, and enhance their employment competitiveness.
- **Value Goals:** To help graduate students fully understand the connotation of Chinese modernization, grasp the development trend of large models driving society into an era of intelligent revolution and brain-computer collaboration, guide students to participate in large model practices, cultivate their awareness of interdisciplinary scientific and technological innovation, and establish lofty aspirations of serving the country through science and technology.

3.2. Teaching Objectives and Student Analysis

The teaching objectives of this general education course are 3050 master's and doctoral graduate students at Yanshan University, coming from 34 disciplines, including mechanical engineering, materials science, control science and engineering, instrumentation science and technology, vehicle engineering, chemical engineering and technology, electronic science and technology, information and communication engineering, computer science and technology, physics, mathematics, industrial design engineering, and design studies.

The needs of master's and doctoral graduate students from various disciplines for general education courses on AI large models are diverse. When designing teaching content and depth, the characteristics and needs of different disciplines should be fully considered to provide students with a learning experience that is both interesting and practical. At the same time, attention should be paid to controlling the difficulty of the course to avoid overly abstract or complex terms and concepts that may affect students' learning enthusiasm.

3.3. Course Hours and Content Design

This course consists of 16 hours, including 13 hours of theoretical teaching and 3 hours of experiments.

In theoretical teaching, the introduction takes 1 hour (supporting teaching goals 1 and 3), covering the background and significance of the course, basic course information, and main content.

“Overview of AI Large Models” takes 3 hours (supporting teaching goals 1 and 3), covering an introduction to AI and large models, the concept of large models, classification of large models, applications of large models, and the current development status of large models at home and abroad.

“Fundamentals of Large Models” takes 4 hours (supporting teaching goals 1 and 3), covering basic concepts of machine learning, basic principles of deep learning, natural language processing large models, computer vision large models, multi-modal large models, embodied large models, fine-tuning, and prompt engineering.

“ChatGLM and Zhipu Qingyan” takes 4 hours (supporting teaching goals 1, 2, and 3), covering the key technologies and application cases of the domestic large model ChatGLM.

“Industrial Applications of Large Models” takes 2 hours (supporting teaching goals 1 and 3), covering foreign enterprise application cases, domestic enterprise application cases, and the current status of large model application implementation at home and abroad.

“Future Development Trends and Challenges of Large Models” takes 2 hours (supporting teaching goals 1 and 3), mainly covering the development trends of large model technology, industrial application trends, AI ethics and security, and the challenges faced by large models.

In experimental teaching, there are four aspects of experimental content:

- Mastering the use of the AI assistant “Zhipu Qingyan”, including: knowledge Q&A, assisted writing, long document interpretation, data analysis, using multi-modal functions to interpret images, and text-to-image.
- Mastering the use of the research intelligence platform “Aminer”, including: academic search, viewing research expert profiles (personal introduction, educational background, work experience, research areas, published papers, collaborative teams, influence, etc.), AI dialogue, AI-assisted writing, research trend analysis, obtaining datasets, viewing essential papers, viewing top journals and conferences, viewing hot news, and tracing trees.

- Mastering the method of personalized customization of intelligent agents (Agents), including: intelligent agent configuration, using APP plugin tools, using UI components and knowledge bases to customize intelligent agents, and publishing intelligent agents.
- Mastering the use of the AI code assistant “CodeGeex”, including: code completion, code repair, code understanding, code generation, and code review, aiming to improve development efficiency and code quality.

Through the above experiments, students’ skills in using AI large model product tools to assist in research, learning, and office work are improved, and their practical hands-on abilities and interest in large model technology are cultivated.

3.4. Course Concepts and Teaching Methods

Based on the characteristics and positioning of AI large models, teaching content is designed to build a teaching content and methodology system that is in line with international standards. With the cultivation of students’ practical abilities as the center and the overall goal of cultivating AI large model talents for graduate students, the dual-drive talent cultivation model of “theory + practice” and “algorithm + software” of Yanshan University is strengthened, and the core competitiveness of students in the employment process is improved.

The teaching concepts of this course mainly reflect three points:

Broaden students’ horizons and help them understand the most cutting-edge technologies in AI.

Focus on practicality and cultivate students’ interest through the use of domestic large model products.

Empower graduate students to conduct research practices through AI.

Based on the above teaching concepts, a case-based teaching method is adopted, integrating basic theories into cases for explanation, making it easier for students to understand. A diversified teaching approach based on “classroom lectures + in-class experiments + research reports” is carried out. In multimedia classrooms, modern teaching methods such as intelligent teaching tools are adopted. With students as the center, communication and interaction between teachers and students are strengthened.

Specifically, theoretical teaching broadens students’ horizons, in-class experiments improve students’ practical hands-on abilities and cultivate their interest in large model technology, and research reports deepen students’ understanding of large model technology and cultivate the basic abilities of graduate students for subsequent research. Research reports are completed outside of class and serve as the main basis for course assessment.

4. Resource Development for General Education Courses on AI Large Models for Master’s and Doctoral Students

4.1. University-Enterprise Cooperation

In March 2023, Yanshan University and Beijing Zhipu Huazhang Technology Co.,

Ltd. (short for Zhipu AI) established the “Yanshan University-Zhipu AI Joint Laboratory for Big Data and Basic Models.” As a standing director unit, Zhipu AI officially settled in Yanshan University’s Hebei Province Excellent Engineer College. The company organizes enterprise case projects into teaching content, and at the same time, provides free access to products such as Zhipu Qingyan, Aminer, and CodeGeex to graduate students, ensuring the forefront and practicality of teaching content and jointly promoting the development of AI education.

4.2. Course Team Construction

The course team consists of senior professors, technical backbone members, and industry experts, with a total of 17 members. The team has a good combination of young and middle-aged members and a good hierarchical structure, providing students with a high-quality teaching experience.

4.3. Practice Base Construction

The “Yanshan University-Zhipu AI” Large Model Hebei Provincial Graduate Workstation has been successfully established. This workstation has become an important base for graduate students to conduct cutting-edge research and practice innovation in AI. Combining industry needs and academic research, it has carried out multiple research projects with practical significance, enabling students to master the application of AI large models in real projects and providing strong support for the improvement of students’ research abilities.

4.4. Textbook Development

The course team has compiled the textbook “Deployment, Fine-tuning, and Development of ChatGLM,” which has been published by China Machine Press. The textbook not only has a unique “beginner verification” practical ability training method but also takes into account the academic expansion of graduate students. It has been applied to the teaching process of general education courses for master’s and doctoral students, providing authoritative reference materials for students’ theoretical learning and large model-related practices.

4.5. Other Resources

We encourage students to participate in AI competitions at home and abroad to exercise their innovation and practical abilities. At the same time, the competition results are transformed into teaching cases to further improve teaching quality. To provide students with more opportunities for practical case studies, we also actively host university, provincial, or national competitions related to AI.

5. Implementation of General Education Courses on AI Large Models for Master’s and Doctoral Students

5.1. Group Discussion and Lesson Preparation

To ensure the systematicness and advancement of course content, we have

organized cross-disciplinary, cross-departmental, and university-enterprise collaborative group lesson preparation activities to jointly discuss and determine teaching outlines, lesson plans, and experimental guides. We discuss teaching highlights and difficulties, unify teaching objectives and methods, and ensure that every teacher can efficiently impart knowledge in the classroom.

5.2. Course Implementation

In the theoretical teaching session, we adopt various teaching methods such as multimedia teaching, interactive Q&A in discussion classes, and case analysis to explain the basic principles, technical frameworks, and application scenarios of AI large models in an easy-to-understand manner, aiming to lay a solid theoretical foundation for students. In the experimental session, students complete multi-round continuous Q&A, prompts, text-to-image, personalized customization of intelligent agents, academic intelligence retrieval, and large model-assisted programming experiments on mobile terminals.

5.3. Academic Competitions

We encourage students to participate in AI-related academic competitions at home and abroad and have hosted national competitions including the “China AI Association Robot Competition” with an AI innovation track, the “China Robot and AI Competition” provincial competition, and the “North China Five Provinces College Robot Competition” provincial competition. Through competition-driven learning, students apply their knowledge to solve practical problems while cultivating teamwork and innovative thinking.

6. Effects of General Education Courses on AI Large Models for Master’s and Doctoral Students

To evaluate students’ learning outcomes, we conducted a questionnaire survey and analysis. The questionnaire included the following content:

- Graduate level
- Satisfaction with the overall course content, chapter content, and experiments
- Evaluation of course difficulty
- Evaluation of teachers’ teaching attitude and teaching methods
- Evaluation of course length
- Help in improving learning and research abilities
- Help in future career development
- Suggestions or opinions on the future development of the course based on professional disciplines or research directions

A total of 813 questionnaires were returned, of which 93% were master’s students and 7% were doctoral students. Through statistical analysis of the questionnaires, in the survey on graduate students’ satisfaction with the course, 97.5% of the students were satisfied or very satisfied, indicating that students are generally satisfied with the course. Regarding the help provided by the course in improving

learning and research abilities, 93.6% of the students found it helpful or very helpful, indicating that the course has significantly improved students' learning and research abilities. In terms of course difficulty, 63.1% of the students found it moderate or easy, and 40.59% found it generally difficult. Therefore, the difficulty can be appropriately increased.

In addition, some students suggested "increasing in-class experiment demonstrations," "closer connection with majors," "strengthening integration with disciplines," "increasing practical teaching," and "making it more hardcore," indicating that the course's difficulty, depth, and connection with majors need to be further strengthened.

In summary, the course objectives have been basically achieved, but teaching strategies need to be further adjusted based on the evaluation results to continuously improve teaching quality.

7. Conclusion

This paper addresses the development trend of general education courses on AI and proposes a teaching reform idea for AI large model general education tailored to the characteristics of local universities, verifying its effectiveness through actual teaching practice. The research results show that the proposed teaching reform measures can effectively improve teaching quality and cultivate students' interdisciplinary awareness, practical abilities, and innovative spirit. In the future, our university will continue to deepen the reform of general education on AI large models to contribute to the cultivation of talents for the new era.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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