

## Research on Educational and Teaching Paths for Specialized Students of Surveying and Mapping in ChatGPT Era

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### Abstract

The use of artificial intelligence technology into the education of students in colleges and universities is the requirement of the times, and the background of the ChatGPT era provides a foundation for the education and teaching path of students specializing in surveying and mapping. This paper analyzes ChatGPT technology and its impact on surveying and mapping education through literature research and work collation, proposes to change the concept of education, strengthen the student's main position; innovative teaching, improve the independent learning ability of college students; strengthen the practice of surveying and mapping teaching, enhance the comprehensive quality of college students; improve the complete evaluation mechanism, all-round assessment of students' learning effect and other countermeasures to students' development as the center, GPT technology as an auxiliary tool, and realize the synergistic development of human-machine. development as the center, GPT technology as an auxiliary tool, to realize the synergistic development of man and machine, to build a harmonious artificial intelligence and education environment, to design a suitable education and teaching path for the students of surveying and mapping, to improve the comprehensive quality and ability of the students of surveying and mapping, in order to adapt to the development needs of the times.

### Keywords

ChatGPT era; Surveying and mapping undergraduate students; Education and teaching.

### 1. Introduction

With the widespread application of the artificial intelligence language model developed by OpenAI, Generative Pre-trained Transformer (hereinafter referred to as ChatGPT), in the education field, ChatGPT has demonstrated outstanding capabilities in data processing and technological advantages. It excels in in-depth analysis of curriculum planning, industry data, and market trends. The field of surveying and mapping undergraduate education is currently facing a series of challenges, including educational system reforms, deficiencies in curriculum planning, diversification of market demands, rapid changes in professional technology, and uncertainties about future prospects. The integration of ChatGPT technology is expected to effectively alleviate the existing issues in educational practice. In the context of the ChatGPT era, research on the educational and teaching pathways for surveying and mapping undergraduate students holds significance beyond merely addressing educational problems. It also aims to promote social development and foster individual student growth.

## 2. Current Status of ChatGPT in Surveying and Mapping Undergraduate Education Pathways

### 2.1. Technical Advantages of ChatGPT

ChatGPT is a natural language processing (NLP) model based on deep learning. It trains on extensive text data using deep learning algorithms to learn the structure and rules of language. This model can generate high-quality text and understand and produce content that conforms to human language habits to a certain extent, showcasing broad application potential. As technology continues to iterate and update, ChatGPT can autonomously engage in deep learning, integrating and processing natural language. By analyzing and learning from vast amounts of text data, it generates content that adheres to grammatical and semantic rules. The algorithms and knowledge base of ChatGPT surpass human brain capacity and processing abilities, akin to a global librarian.

Current scholars believe that ChatGPT has effectively addressed challenges in pre-training, large models, and generative capabilities. This specialized breakthrough has positioned ChatGPT as a more intelligent solution compared to other artificial intelligence models, making it one of the representative products of new-era AI technology. ChatGPT's intelligent learning abilities, real-time response, and diverse functions provide new methods and strategies for problem-solving. For surveying and mapping undergraduate students, ChatGPT can serve as a virtual teacher, offering immediate Q&A services until user satisfaction is achieved. Additionally, it can function as an online library, providing rich knowledge and book resources. Overall, through conversational formats, ChatGPT can address a variety of specialized problems.

### 2.2. Current Status of Teaching Surveying and Mapping Undergraduate Students with ChatGPT

In the context of the ChatGPT era, domestic scholars have conducted in-depth research and exploration on the transformation of educational methods, updates to training plans, curriculum design, teaching models, and practical operations in the surveying discipline. In his book "Research on Strategic Issues of Surveying and Geoinformation in the New Era," Chen Changsong points out that the future development strategies for the surveying and geoinformation industry in the new era mainly focus on technological innovation, data application, environmental sustainability, talent cultivation, and international cooperation, summarizing the opportunities and challenges faced by the surveying industry. Gao Jingxiang suggests innovating the "Internet + Cloud Platform" teaching method to improve teaching quality and cultivate innovative surveying professionals. Currently, the close integration of surveying education pathways with ChatGPT has become a new trend in educational development. This combination, using digital technology to build a new model of the "human-machine symbiosis" system, aims to make educational pathways more comprehensible and provide lifelong services to students. Some universities have already begun integrating AI technology into surveying education courses, achieving the combination of ChatGPT and surveying, and experimenting with innovative teaching models such as "human-machine teaching." Although these measures have achieved certain results, there is still a general lack of cultivation of student independence and personalized curriculum design. The advent of the ChatGPT era demands a transformation of the training models for surveying and mapping undergraduate students.

### **3. The Beneficial Impact of ChatGPT Technology on Education and Teaching for Undergraduate Students Majoring in Surveying and Mapping**

#### **3.1. Enhancing the Learning Efficiency of Undergraduate Students in Surveying and Mapping with ChatGPT Technology**

As an advanced tool in artificial intelligence natural language processing, ChatGPT significantly enhances the learning efficiency of surveying and mapping undergraduate students. It swiftly acquires and processes specialized knowledge in the field of surveying, aiding students in mastering technical operations and data analysis skills. Specifically, ChatGPT provides rapid access to and explanations of professional terminology for students and aids in their comprehension of complex concepts through concrete examples. In terms of homework assistance, ChatGPT offers problem-solving steps, strategies, and relevant examples, enabling students to better apply their acquired knowledge. Furthermore, ChatGPT assists students in data recording and analysis, provides data processing suggestions, and aids in regular review and summarization, thus reinforcing knowledge consolidation and constructing a systematic knowledge framework.

#### **3.2. Enhancing the Teaching Quality of Undergraduate Education in Surveying and Mapping with ChatGPT Technology**

ChatGPT technology also plays a crucial role in enhancing teaching quality. It helps teachers provide innovative ideas and suggestions during course design, assists in retrieving and organizing literature and materials, and generates course outlines and plans. ChatGPT recommends suitable textbooks based on students' learning progress and comprehension levels, and simulates actual surveying scenarios to help students better understand course content. Serving as an online teaching assistant, ChatGPT answers students' questions promptly, providing timely responses to both theoretical knowledge and practical operational issues. Moreover, ChatGPT assists teachers in homework management by analyzing students' submitted electronic assignments, offering personalized feedback, helping students identify their weaknesses, and providing targeted learning recommendations.

### **4. Challenges in the Application of ChatGPT Technology in Education**

With the digitalization of surveying and mapping education in universities, the application of artificial intelligence technology, especially ChatGPT technology, has become a trend in the field of education. However, the advent of the ChatGPT era has also brought a series of challenges, including risk management, ethical issues, user privacy, and data security, to promote the development of educational paths, enhance teaching quality and effectiveness, we must take effective measures to address these challenges. In the research process, we face issues such as innovative thinking, mechanism optimization evaluation, and the establishment of new digital relationships. In the face of these difficulties, educators need to adopt a flexible attitude and explore new features, technologies, and fields of digital teaching paths.

#### **4.1. Challenges in Talent Cultivation**

The popularity of ChatGPT technology is profoundly changing the surveying and mapping industry and placing new demands on the cultivation of surveying and mapping talents. The traditional surveying and mapping knowledge system needs to be integrated with new technologies, which requires educators to rethink and redefine the training goals of undergraduate students majoring in surveying and mapping to adapt to the requirements of the ChatGPT era. The curriculum content needs to be constantly updated to include the latest technological developments. However, the lag in updating the curriculum content may lead to

a disconnect between the knowledge learned by students and technological developments. Additionally, while ChatGPT can help improve teaching quality, it cannot replace the importance of students' practical experience. The surveying and mapping profession needs to provide sufficient practical opportunities to develop students' practical skills and on-site work abilities. With automation tools gradually replacing repetitive tasks, the surveying and mapping profession needs to cultivate students' innovation and problem-solving abilities, requiring educators to provide corresponding training environments and challenging projects. In the ChatGPT era, the cultivation of undergraduate students in surveying and mapping needs to address issues such as redefining training goals, updating curriculum content in a timely manner, integrating theory and practice, fostering innovation, integrating interdisciplinary knowledge, guiding career planning, and strengthening ethical and legal awareness, which requires joint efforts from educators and the industry to cultivate more competitive surveying and mapping professionals.

#### **4.2. Challenges in Meeting the Demands of the New Era Surveying Industry and Educational Paths**

In the new era of rapid development of artificial intelligence technology, undergraduate students majoring in surveying and mapping are facing technical limitations and challenges in educational paths. Traditional surveying and mapping teaching methods have gradually failed to meet the current demands of the surveying and mapping industry as surveying technology is iterating rapidly. To adapt to the development of the times, students need to continuously learn new technologies and methods. However, some universities lack resources for surveying and mapping education, which limits students' access to sufficient surveying and mapping practice opportunities. Students lacking practical experience may encounter difficulties in meeting the market demands in the ChatGPT era. Additionally, with the linear growth of data volume, higher requirements are placed on students' abilities in data processing and analysis to meet market demands.

#### **4.3. Challenges in Interdisciplinary Integration and Curriculum Design**

The arrival of the ChatGPT era has also brought about demands for interdisciplinary knowledge and perspectives for undergraduate students majoring in surveying and mapping. The surveying profession is no longer limited to geographic information and engineering surveying but intersects with multiple disciplines such as computer science, physics, and mathematics. Therefore, students need to possess interdisciplinary knowledge and abilities to adapt to the needs of industry development. However, many universities currently lack the foundation for integrating interdisciplinary knowledge into curriculum design, resulting in students having a single knowledge structure that is difficult to cope with complex and changing practical problems. To address these issues, universities need to update curriculum content, strengthen the integration of interdisciplinary teaching resources, and provide more practical opportunities to cultivate students' innovation and problem-solving abilities.

#### **4.4. Academic Integrity Issues in the ChatGPT Era**

In the ChatGPT era, undergraduate students majoring in surveying and mapping are facing an increase in the risk of plagiarism and academic integrity challenges. Using ChatGPT-generated articles as assignments may not only lead to a lack of students' ability to think independently but also pose risks of violating academic integrity principles. Since the text generated by ChatGPT is based on pre-training data and is not original, students directly using this text will violate academic integrity requirements. Additionally, some students may use artificial intelligence tools to copy and paste others' research results, seriously ignoring the importance of academic integrity principles. In the field of surveying and mapping, the authenticity and reliability of data are crucial, and any tampering or fabrication of data may have serious

consequences, even threatening life safety. Therefore, it is necessary to resolutely prevent the use of ChatGPT for data tampering, which is the bottom line of academic integrity.

#### **4.5. Impact of the ChatGPT Era on Student Autonomy**

In the ChatGPT era, some phenomena have emerged in the education and teaching of undergraduate students majoring in surveying and mapping, weakening their autonomy. Firstly, students may excessively rely on tools like ChatGPT for knowledge retrieval, leading to a decline in their ability for independent thinking and self-directed learning. Secondly, due to the fragmented nature of knowledge presentation in tools like ChatGPT, students may struggle to construct comprehensive knowledge frameworks, hampering their deep understanding and mastery of surveying knowledge. Lastly, excessive dependence on these tools may hinder students' hands-on practice and innovation abilities, limiting their capacity to flexibly apply acquired knowledge in real-world scenarios. Addressing these issues requires concerted efforts from educators and students to cultivate critical thinking, enhance academic integrity education, and encourage practical innovation.

### **5. Exploring Educational Pathways for Undergraduate Students Majoring in Surveying and Mapping in the ChatGPT Era**

#### **5.1. Adjustment of Educational Philosophy to Adapt to the ChatGPT Era**

To adapt to the ChatGPT era, the education of undergraduate students majoring in surveying and mapping needs to shift its educational philosophy from a traditional teacher-centered model to a student-centered teaching model. This shift encourages students to develop independent learning abilities, with teachers transitioning into facilitators who assist students in developing personalized learning plans and encourage them to pursue academic goals. Teachers should emphasize the importance of students setting learning objectives and consciously cultivate students' abilities for independent learning. Additionally, teachers should encourage students to utilize ChatGPT for independent and exploratory learning to promote a deeper understanding of surveying and mapping knowledge. Providing personalized learning resources and plans can enhance students' enthusiasm and interest in learning. Teachers should also design teaching based on students' needs and interests, focusing on personalized and differentiated teaching to meet the learning needs of different students.

#### **5.2. Strengthening Student-Led Teaching Strategies**

In the process of strengthening student-led teaching, it is important to strictly adhere to the educational philosophy of student-led teaching with ChatGPT as an aid. This requires teachers to promptly prevent students from excessively relying on ChatGPT tools and provide appropriate guidance to students. This approach ensures that students maintain critical thinking when using ChatGPT and develop the ability to independently solve problems. At the same time, teachers need to monitor students' learning progress to ensure that they can effectively achieve learning objectives with the assistance of ChatGPT, rather than solely relying on the technology. This balanced teaching approach aims to cultivate students' comprehensive abilities, including independent learning, critical thinking, and innovation skills, to adapt to the rapidly changing ChatGPT era.

#### **5.3. Updating Thinking on Student Cultivation Work**

In the ChatGPT era, teachers of undergraduate surveying and mapping majors in universities should actively innovate teaching methods and integrate ChatGPT technology into curriculum teaching. Teachers can use ChatGPT to monitor students' learning status and develop suitable learning resources and tutoring plans accordingly. Teaching methods can combine online ChatGPT-assisted teaching with offline teacher instruction to improve teaching effectiveness



and quality. Additionally, teachers can introduce online educational resources and remote education platforms, using diversified teaching methods such as online Q&A, lectures, tutoring, and assessments, combined with offline classroom explanations and group discussions, to promote students' independent learning abilities and cooperative communication. As a virtual character, ChatGPT can also facilitate discussions and knowledge sharing among students, thereby achieving mutual growth through collaboration.

#### **5.4. Strengthening Practical Skills and Optimizing Student Competency Framework**

**Emphasizing Practical Skills Development in the ChatGPT Era.** In the ChatGPT era, higher education institutions should prioritize the cultivation of practical skills among undergraduate students majoring in surveying and mapping to enhance their comprehensive practical abilities and optimize their competency framework, enabling them to fully adapt to the societal demands of the intelligent era. Teachers should focus on nurturing students' practical operational skills and innovative thinking abilities, ensuring that students can apply theoretical knowledge to practical operations in experiments, practical training, and internships. Universities should provide abundant practical opportunities for undergraduate students majoring in surveying and mapping, such as establishing training bases through school-enterprise cooperation, allowing students to experience surveying and mapping work during their academic period, or introducing ChatGPT simulation training projects to involve students in the entire process from data collection to data analysis. Additionally, encouraging students to identify problems during practice and attempt to find solutions using ChatGPT can enhance their innovation skills and integrate specific engineering examples to cultivate their innovative thinking. Through participating in the analysis and problem-solving process, students can indirectly develop their abilities for independent thinking and active learning, thereby enhancing their understanding and practical application of surveying and mapping. School-enterprise cooperation can also provide employment opportunities for students, enhancing their competitiveness in the job market. Furthermore, it is crucial to enhance the professional level and practical teaching experience of surveying and mapping teachers. Teachers should actively participate in related scientific research and industry practices to ensure the high-level development of the teaching faculty and maintain the cutting-edge nature of practical teaching and technology. These methods can effectively improve students' practical abilities and problem-solving skills, enhancing their comprehensive qualities and competitiveness.

#### **5.5. Improving Evaluation Mechanisms for Scientific Assessment of Student Learning Outcomes**

In the ChatGPT era, the educational pathways for undergraduate students majoring in surveying and mapping need to keep pace with the times, and universities should improve evaluation mechanisms to scientifically assess student learning outcomes. To achieve this, a comprehensive evaluation index system should be constructed, which should combine the characteristics of surveying and mapping majors and cover multiple dimensions such as students' knowledge mastery, skill application, and practical operation abilities. The evaluation system should comprehensively consider students' extracurricular activities, classroom performance, research participation, and surveying and mapping practice to comprehensively assess students' comprehensive practical qualities. Implementing a combination of formative and summative assessment methods, focusing on the continuous progress of students' learning processes. By recording classroom discussions and completion of assignments, assess students' mastery of knowledge. Utilizing ChatGPT-assisted evaluation can automate assignment grading and testing of surveying and mapping knowledge points, improving evaluation efficiency. Additionally, by monitoring student behavioral data, ChatGPT can provide personalized evaluation suggestions for teachers. Establishing an immediate feedback mechanism helps

students understand their learning situation in real-time and cultivate independent critical thinking. Teachers can use technologies like ChatGPT to conduct comprehensive evaluations through a combination of online testing and offline examinations. This enables a comprehensive understanding of students' learning situations and comprehensive qualities, while also providing differentiated and targeted teaching guidance based on individual student learning situations to help students develop better.

## 6. Future Outlook

With the rise of AI technologies like ChatGPT, the primary core issue facing undergraduate education in surveying and mapping is how to construct an educational model that coexists harmoniously with AI technology. The intelligent education facilitated by ChatGPT in undergraduate surveying and mapping education holds immense potential for development. Faced with higher-level educational demands, the development of intelligent education in China still has a long way to go. There is an opportunity for surveying and mapping education to pioneer an innovative path that combines traditional educational practices with intelligent technology. The adaptive learning capability of ChatGPT can complement the characteristics of students, working in tandem with them. In the process of surveying and mapping practice, ChatGPT can record real-time data and verify the correctness of learning outcomes through extensive data collection. The development of educational informatization provides students with a wealth of excellent surveying and mapping works and educational course resources, which not only provides abundant learning resources for undergraduate students but also valuable learning and reference opportunities for educators.

## 7. Conclusion

The advent of the ChatGPT era signifies the profound impact of informatization, digitization, and intelligence in the field of higher education. These transformations are reshaping students' learning methods and driving the transformation of talent cultivation models in higher education. Artificial intelligence, as an important topic that has received widespread attention and in-depth research in recent years, has been regarded as a key force in promoting the modernization of education. In the report of the 20th National Congress of the Communist Party of China, artificial intelligence was explicitly identified as an important strategic support for "promoting education digitization and building a learning society and a learning-oriented country for all." The World Digital Education Conference held in Beijing in 2023 further emphasized the central role of artificial intelligence in the digital transformation of higher education under the theme of "Digital Transformation and the Future of Education." Looking to the future, educators must adhere to educational values and ethical standards, focusing on the comprehensive development of students in morality, ethics, mental state, innovation, and creativity. At the same time, we should make rational use of artificial intelligence tools such as ChatGPT to ensure continuous advancement in the intelligent development of higher education, based on the correct and reasonable use of artificial intelligence. This not only involves the application of technology but also concerns the cultivation of high-quality talents with a sense of responsibility, innovative spirit, and social adaptability, making contributions to the happiness of humanity and social progress.

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