# Research on the Teaching Reform of Engineering Drawing Courses in Application-oriented Universities under the Background of Artificial Intelligence

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**Abstract:** *With the rapid development of artificial intelligence technology, engineering drawing courses in application-oriented universities face problems such as too much theory, lagging teaching methods, and disconnection between students' practical abilities and social needs. Based on the background of artificial intelligence technology and the current demand for talent in engineering technology, the teaching status and challenges of engineering drawing courses are systematically analyzed. The core reform path of optimizing the curriculum system, innovating teaching methods, strengthening the construction of teachers, and improving the evaluation mechanism are suggested. Through the introduction of modular teaching, virtual reality (VR) and augmented reality (AR) technology, school-enterprise cooperation projects, and other practical measures, students' spatial imagination, drawing skills, and innovative thinking ability have been significantly improved, and their ability to solve practical engineering problems has been enhanced. The research results show that teaching reform should consider combining theory and practice. Integrating modern means such as three-dimensional modeling software and competition mechanisms stimulates students' active learning motivation. The in-depth cooperation between schools and enterprises can ensure that the teaching content is synchronized with the industry's cutting-edge technology and promote the accurate docking of talent training and industrial demands. A theoretical basis and practical reference for the reform of engineering drawing courses in application-oriented universities is achieved, and it has a positive significance for promoting the training of talent in the field of engineering technology.*

**Keywords:** *Application-oriented universities, Engineering Drawing Courses, Teaching reform, Innovation ability, School-enterprise cooperation*

## 1. Introduction

With the rapid development of science and technology, artificial intelligence technology has gradually penetrated all aspects of our lives and become an important force to promote social progress [1-3]. The latest development trend of artificial intelligence is mainly reflected in the continuous progress of deep learning, reinforcement learning, natural language processing, and other technologies, and artificial intelligence technology has been widely used in intelligent manufacturing, smart cities, innovative medical, and other fields. These technologies significantly improve production efficiency and greatly optimize people's lifestyles [4-6].

In deep learning, by simulating the working principle of the human brain's neural network, the computer can identify and process a large amount of unprocessed data to achieve more accurate prediction and analysis. It has shown strong application capabilities in image recognition, speech recognition, and natural language processing and has provided strong support for the further development of artificial intelligence [7].

Reinforcement learning is a strategy that learns by trial and error. It enables agents to continuously optimize their behavior strategies in interaction with the environment to achieve predetermined goals. It has broad application prospects in game AI and autonomous driving, and it is one of the important directions for the development of artificial intelligence.

Natural language processing technology has also made significant progress, enabling computers to understand and process human languages more deeply. Through natural language processing, computers can analyze texts' emotional tendencies, extract key information, and even perform tasks such as

automatic translation. It significantly promotes the efficiency of cross-language communication.

## 2. Social needs and engineering drawing courses

With the rapid development of engineering technology, the demand for talent with engineering drawing abilities is becoming increasingly urgent. As the basic language of engineering technology, engineering drawing is a communication bridge between engineers and an indispensable part of the engineering project process from design to implementation. Mastering engineering drawing skills is directly related to the project's quality, efficiency, and safety

Engineering drawing courses are self-evidently important as they are the key to cultivating students' core skills. It requires students to draw and interpret various engineering drawings accurately and emphasizes cultivating students' spatial imagination, innovative thinking, and ability to solve practical problems. These abilities enable students to quickly adapt to future engineering practice's complex and changeable working environment to solve various practical problems effectively.

To meet the needs of the society for engineering drawing talent, application-oriented universities are constantly reforming and exploring the teaching of engineering drawing courses. On the one hand, the frontier and practicability of students' knowledge are ensured by optimizing the course content and introducing the latest engineering drawing technology and standards. On the other hand, universities also pay attention to the setting of practical activities and provide students with more practical opportunities through school-enterprise cooperation and practical training projects. Students can continuously temper and improve their engineering drawing skills in practice.

Implementing these teaching reform measures improves students' engineering drawing abilities and cultivates many talent with high-quality engineering drawing skills for society. These talent play an important role in their respective positions and have positively contributed to the development of the engineering technology field.

With the progress of science and technology and the continuous innovation of engineering technology, engineering drawing will encounter more challenges and opportunities. It requires application-oriented universities to maintain the attitude of advancing in teaching engineering drawing courses and constantly adjust and improve the teaching content and methods to meet social development needs and industry changes. At the same time, universities should strengthen contact and cooperation with enterprises and industries, jointly promote the innovation and development of engineering drawing technology, and provide strong support for training more high-quality engineering drawing talent [8].

Engineering drawing courses should also focus on cultivating students' professionalism and comprehensiveness. In the teaching process, teachers should guide students in establishing a correct engineering ethics concept and cultivating their rigorous and meticulous work attitude and spirit of unity and cooperation. Through diversified teaching methods and practical activities, students' innovative consciousness and exploration spirit are stimulated to master professional skills and have good humanistic qualities and social responsibility.

There is a close relationship between social needs and engineering drawing courses. To meet society's need for talent with high-quality engineering drawing skills, application-oriented universities should continuously deepen the teaching reform of engineering drawing courses, improve the quality and effect of teaching, and cultivate more excellent talent for developing engineering technology.

## 3. Importance and significance of teaching reform

In the face of rapidly changing social needs and the development trend of engineering technology, the teaching reform of engineering drawing courses is becoming increasingly important. The core purpose of the reform is to better adapt to the industry's needs. It cultivates and transports professional talent with a solid engineering drawing foundation and good innovation ability.

The rapid development of engineering technology has raised the requirements for engineers' drawing abilities. Engineers need to draw and interpret drawings accurately, have excellent spatial imagination and innovative thinking, and solve practical problems. To meet these needs, the teaching of engineering drawing courses must keep pace with the times and undergo corresponding reform.

The specific implementation of teaching reform includes updating teaching content, improving teaching methods, and introducing new teaching methods. For example, teachers should closely target

the professional direction, use advanced teaching software for teacher-student interaction, and improve students' learning experience and practical abilities. Establishing a professional library and introducing competitions are conducted to stimulate students' enthusiasm for learning and improve their abilities to use knowledge [9].

The benefits of teaching reform are multifaceted. First of all, it helps to improve students' employment competitiveness. By mastering advanced mapping techniques and methods, students will be more likely to stand out in the fierce employment competition. Secondly, teaching reform also helps to promote innovation and development in the field of engineering technology. Professional talent with innovative ability and solid engineering drawing foundation will contribute their strength to the industry's progress [10].

The teaching reform of engineering drawing courses is of great significance in improving the quality of talent training. By implementing targeted reform measures, professional talent that meets society's needs can be better cultivated, injecting new vitality into engineering technology development.

Teaching reform should also focus on cultivating students' practical abilities. Engineering drawing is a practical course, and students need to master drawing skills through many practical exercises. Therefore, the proportion of practical activities should be increased in the teaching process to provide students with more practical opportunities. Teachers can also guide students in participating in actual engineering projects. It can ensure that students learn and apply engineering drawing knowledge in practice and improve their practical and problem-solving ability.

With the continuous development of information technology, the teaching methods of engineering drawing can also be innovated. For example, emerging technologies such as virtual reality (VR) and augmented reality (AR) can create a more intuitive and vivid learning environment for students. These technical means can help students better understand the spatial structure and improve their spatial imagination, improving the teaching effect of engineering drawing.

In teaching reform, teachers need to constantly pay attention to the latest developments in the industry, adjust the teaching content and methods in time, and ensure the close integration of teaching and industry needs. Teachers should continuously improve their professional quality and teaching abilities to provide students with better teaching services.

The teaching reform of engineering drawing courses is a long-term and complex process that requires continuous exploration and practice. More professional talent with a solid engineering drawing foundation and innovation ability can be cultivated through teaching reform, and more remarkable contributions to engineering technology development can be made. It is responsible not only for students but also for society and industry. Therefore, teachers should fully realize the importance and urgency of the teaching reform and actively promote the teaching reform of engineering drawing courses.

Teachers should also be aware that teaching reform is not an overnight process but requires continuous efforts and exploration. Teachers should keep an open mind, actively learn from advanced teaching experience and ideas at home and abroad, and constantly improve their teaching methods and means. Only in this way can teachers ensure that the teaching of engineering drawing courses always keeps pace with the times and cultivates more high-quality talent in line with social needs.

## 4. Curriculum setting and teaching content

Application-oriented universities are facing a series of challenges in setting and teaching the content of engineering drawing courses. These challenges are mainly reflected in two aspects. First, the curriculum puts too much emphasis on theoretical knowledge, and the combination of practical operations is not close enough. Second, the teaching content is relatively old and fails to keep up with the rapid development of engineering technology.

In terms of curriculum setting, many universities put too much emphasis on the theoretical knowledge of engineering drawing, such as projection principles and drawing specifications. The cultivation of students' practical operation abilities is ignored. After completing their studies, students have mastered a specific theoretical knowledge. Facing practical engineering drawing tasks, they often feel at a loss. It is challenging to transform knowledge into practical abilities. In order to change this situation, it is necessary to adjust the curriculum and increase the proportion of practical operations. So that students can deepen their understanding of theoretical knowledge in practice and improve their practical application abilities.

Regarding teaching content, with the continuous progress of science and technology, engineering technology is also developing rapidly. The teaching content of engineering drawing courses in many universities has not been updated in time, and it still stays at the level of several years or even more than ten years ago. This lag leads to students' inability to access the latest engineering and drawing technology in the learning process, affecting their knowledge update and ability improvement. Therefore, universities should pay close attention to engineering technology development, adjust the teaching content in time, and ensure students can master the latest knowledge and technology.

Given the above problems, some universities have begun teaching reforms in engineering drawing courses. For example, some universities have introduced the modular teaching concept and divided the engineering drawing courses into several relatively independent teaching modules. Each module is developed around a specific engineering practice project. Students can learn and apply engineering drawing knowledge in practice through this teaching method to better understand and master these courses. Universities are also trying to integrate the latest engineering and mapping technology achievements into their teaching content. Students can access the most cutting-edge knowledge and technology in the learning process to enhance their interests and motivation.

In order to better adapt to industry and social development needs, universities should also strengthen cooperation and exchanges with enterprises to understand their needs and standards for engineering drawing talent and adjust the curriculum and teaching content more pertinently. In this way, universities can cultivate more excellent engineering drawing talent that meets social needs and make more outstanding contributions to engineering technology development.

Application-oriented universities need to carry out corresponding reforms and adjustments in the setting and teaching content of engineering drawing courses. By increasing the proportion of practical operations, updating teaching content, and strengthening cooperation and communication with enterprises, students ' engineering drawing abilities can be better cultivated to meet society's need for talent in this field. It is not only a need for the development of universities but also an important way to promote the innovation and development of engineering technology.

## 5. Conclusions

Traditional teaching methods and means have shown limitations in engineering drawing courses. Traditional lecturing teaching often relies too much on teachers' unilateral teaching while students are passively accepting. It leads to students' lack of active participation and interaction opportunities, further affecting their learning interests and effects. The traditional teaching method fails to fully use modern teaching means, such as three-dimensional modeling software and virtual reality technology. Introducing the latest technologies can significantly enrich the teaching content, improve the teaching effect, and especially play an irreplaceable role in cultivating students' spatial imagination and innovative thinking.

To solve these problems, teachers need to reform their teaching methods and means. First, teachers should change their teaching concept from teacher-centered to student-centered. It can fully exploit students' subjective initiative, stimulating their interests and motivation in learning. Through project-based learning, students can master the knowledge and skills of engineering drawing in practical operation. It can improve students' learning and cultivate their practical abilities and innovative spirit.

Teachers should fully use modern teaching methods, such as three-dimensional modeling software and virtual reality technology, to assist in teaching. These technologies can help students better understand and master abstract concepts in engineering drawing and improve their spatial imagination ability and innovative thinking. Using 3D modeling software, students can visually see the 3D model of the object to understand its structure and shape better. Through virtual reality technology, students can feel the practical application of engineering drawing, improving their interests and practicability of learning.

Teachers can improve students' participation and interaction by conducting various teaching activities, such as group discussion, case analysis, and practical operation. These teaching activities enable students to find and solve problems in practical operation, improving their practical and problem-solving ability. The activities can also cultivate students' teamwork spirit and communication ability and lay a solid foundation for their career development.

The teaching methods and means of engineering drawing courses need to keep pace with the times and constantly carry out reform and innovation. By changing the teaching concept, using modern teaching methods, and carrying out various teaching activities, teachers can better cultivate students'

engineering drawing abilities and meet the needs of society for engineering drawing talent. These reform measures can also improve students' learning interests and effects and support their development.

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