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Effectiveness Analysis and Teaching Reform of Engineering Drawing Courses in Application-Oriented Universities Based on Wuzhou University

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Abstract

With the background of digital transformation, Wuzhou University's engineering drawing courses face problems with outdated teaching content, single teaching methods, and weak practical teaching links. It restricts the cultivation of students' practical abilities and the improvement of teaching quality. By analyzing the current situation of the courses, the core contradictions of the disconnection between theoretical teaching and practical application, the lag of technology updates, and the low participation of students are pointed out. The systematic reform path is proposed. The teaching content should be optimized, and new CAD technology, 3D modeling, virtual reality, and other cutting-edge tools should be introduced. The teaching methods should be innovated, and the case teaching, project-driven, and flipped classroom models should be integrated. The school-enterprise cooperation should be strengthened, and a practical platform in a real engineering environment should be built. The research results show that the multi-dimensional reform can significantly improve students' engineering drawing ability, innovative thinking, and professional quality. It can provide a practical reference for engineering and technical talent training in application-oriented universities.

Keywords

Application-oriented universities. Engineering drawing courses. Teaching reform. Practice teaching. Virtual reality technology.

1. Introduction

With the wave of digital transformation sweeping the world, artificial intelligence (AI) technology is reshaping the educational ecology at an unprecedented speed. From the popularization of personalized learning systems to the innovation of education evaluation systems, the penetration of artificial intelligence in education breaks the boundary of traditional teaching mode. It reconstructs a new paradigm of education equity and quality improvement. However, this technological revolution brings opportunities, ethical dilemmas, and structural contradictions. It is necessary to systematically examine its development status and future trends [1-3].

AI technology is reshaping the face of higher education at an unprecedented speed, and its application has evolved from an auxiliary tool to a core driving force for educational reform. This technological revolution has changed teaching methods and learning models and shown great potential in promoting educational equity and optimizing resource allocation. It has also brought new challenges, such as academic ethics and data security [4-6].

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The deep integration of AI and higher education must balance technological innovation and education essence. It is necessary to strengthen the application of AI technology in personalized training, scientific research assistance, and other fields and establish the value orientation of "technology towards goodness" to prevent instrumental rationality from eroding the humanistic core of education. It is necessary to construct a three-dimensional governance framework of "technology empowerment-institutional constraints-humanistic guidance" so that AI can become a competent partner to promote educational equity and improve teaching quality.

AI is promoting the transformation of higher education from "standardized training" to "personalized development" and upgrading from "knowledge transfer" to "ability shaping." The essence of this change is a deep game between technical rationality and education essence. A new realm of higher education in the digital era can be opened only by taking education's original intention as the anchor point and technological innovation as the engine.

The deep application of AI is reconstructing the relationship between educational subjects. Teachers have gradually transformed from knowledge imparters to learning guides, and their core functions have shifted to designing creative teaching activities that AI cannot replace. The intelligent marking system can undertake more than 60 % of the objective question correction tasks so teachers can devote more energy to personalized feedback and thinking training. The role of students has changed from a passive recipient to an 'AI collaborator,' and cultivating human-machine collaborative thinking and metacognitive ability is necessary. Some innovative courses begin to teach students how to effectively prompt AI tools, verify the reliability of generated content, and transform AI output into innovative solutions. This transformation requires the education system to redefine the core literacy standards of the 21st century.

2. The Current Situation and Existing Problems of Engineering Drawing Courses

The weakness of practical teaching is an important problem faced by the current engineering drawing courses. Due to the limited practical teaching resources and insufficient practical teaching time, students' practical abilities and skills cannot be effectively improved. This situation affects students' learning and restricts the cultivation of high-quality engineering and technical talent [7-8].

The above problems in the engineering drawing courses have seriously affected the teaching quality and effect. The old teaching content and single teaching methods make it difficult for students to access the latest engineering drawing technology and methods. It makes it hard to adapt to the rapid development of society and industry. The weakness of practical teaching makes students' practical skills ineffectively improved, and it is difficult for them to meet the actual needs of enterprises and society. These problems restrict students' personal development and harm the quality of talent training in application-oriented universities [9-10].

Given the above problems, it is urgent to carry out comprehensive and in-depth teaching reform. The teaching reform should start with teaching content, methods, and practical teaching links to improve the quality and effect of engineering drawing courses. By introducing the latest engineering drawing technology and methods, adopting diversified teaching methods, and strengthening practical teaching links, students' learning interests and initiative can be stimulated, and their innovative thinking and practical ability can be cultivated. It can cultivate more high-quality engineering and technical talent for society.

The development status of engineering drawing courses in application-oriented universities is not optimistic, and a series of problems must be solved. To promote the sustainable development of engineering drawing courses and improve the teaching quality and effect, teachers must face these problems and actively seek solutions. Through comprehensive and in-

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depth teaching reform, the engineering drawing courses can better serve the training needs of high-quality engineering and technical talent in the future.

3. Analysis of Teaching Content and Methods

Although Wuzhou University has a specific teaching system and content arrangement for engineering drawing courses, some areas still need improvement. In-depth analysis and reflection are necessary, especially in the teaching content and methods.

Regarding teaching content, the current curriculum design focuses on the indoctrination of theoretical knowledge, and the combination with practical engineering applications is relatively weak. Engineering drawing is an efficient course. If its theoretical knowledge cannot be combined with practical operation, it is not easy to cultivate students with real engineering drawing ability. Therefore, the teaching content should pay more attention to combining theory and practice and introduce more practical engineering cases so that students can master and apply theoretical knowledge in solving practical problems.

The existing teaching content has shortcomings in the update speed. With the progress of science and technology and the continuous development of the engineering field, new mapping techniques and methods emerge in an endless stream. However, the current teaching content has failed to keep up with these changes and remains in the relatively old knowledge system. It leads to a large gap between students' knowledge learned at school and the industry's needs, which is not conducive to their future career development.

Regarding teaching methods, the engineering drawing courses at Wuzhou University are too traditional and single. Teachers' teaching still dominates classroom teaching, and students are in a state of passive acceptance. This teaching method makes it difficult to stimulate students' learning interest and enthusiasm and may lead to their boredom in learning. To change this situation, teachers must try more teaching methods and means, such as case teaching, project-based teaching, and flipped classrooms, to increase classroom interaction and student participation.

The existing practical teaching is relatively weak. Although a certain amount of practical operation time is arranged in the courses, these practices are often only simple simulation operations far from the real engineering environment. To improve students' practical ability and professional quality, universities should strengthen cooperation with enterprises, provide students with more internships and practical opportunities, and allow them to exercise and improve themselves in a real engineering environment.

There is still much room for improvement in the teaching content and methods of engineering drawing courses at Wuzhou University. By optimizing the teaching content, updating the knowledge system, enriching the teaching methods, and strengthening practical teaching links, the teaching quality and effect of the courses can be further improved. More high-quality engineering and technical talent meeting social needs can be cultivated.

4. Analysis of Student Learning

In the engineering drawing course at Wuzhou University, students' learning situations present some problems. These problems are mainly due to a lack of teaching content, methods, and practical teaching.

Regarding teaching content and methods, the current teaching system may emphasize theoretical teaching while ignoring the combination of theory and practice. Engineering drawing is a convenient course. Simple theoretical teaching often makes it difficult for students to understand and master the core points deeply. When the teaching content is too abstract and disconnected from the practical engineering application, it is difficult for students to apply the

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knowledge to the practical operation. In addition, the singleness of teaching methods is also an important factor affecting students' learning effect. Traditional spoon-feeding teaching cannot stimulate students' learning interests but may make them resist the course.

The weakness of practical teaching is an important reason for students' poor learning effect. The ultimate goal of engineering drawing courses is to cultivate students' practical operation abilities to draw engineering drawings skillfully and accurately. However, if the practical teaching link is not paid enough attention, the student's practical ability cannot be effectively improved. This deficiency affects students' course performance and hinders their future career development.

To solve these problems, teachers must reform the teaching content, methods, and practical teaching. The teaching content should pay more attention to the combination with practical engineering application so that students can understand and master the application of the knowledge in practical operation while learning theory. The teaching methods should be more diversified and innovative. Students' learning interests and enthusiasm can be stimulated by introducing interactive teaching methods such as case analysis and group discussion. Practical teaching should be strengthened to provide more hands-on opportunities for students to improve their practical skills.

Students ' learning attitudes and methods also need to be guided and improved. Students should participate more actively in the course learning and actively think and solve problems. They must learn how to combine theoretical knowledge with practical operations and constantly improve their comprehensive quality and ability. Only in this way can students better adapt to and cope with various challenges in their future careers.

5. Teaching Content Optimization

With the rapid development of science and technology, new technologies and methods are constantly emerging in engineering drawing. Updating teaching content is particularly important to enable students to keep up with the pace of the times and master cutting-edge technical knowledge. By introducing new technologies and methods, students' learning interests can be stimulated, and their ability to solve practical problems can be improved.

In computer-aided design (CAD), teachers can increase the latest CAD software teaching so that students can understand and master these tools' skills. 3D modeling and virtual reality technology are hot spots in engineering drawing. These contents can be integrated into the courses so students can practice in a virtual environment and improve their spatial imagination and drawing abilities.

Practical engineering cases and projects can be introduced to help students understand and apply what they have learned. By analyzing and solving these problems, students can experience the practical application of engineering drawing, which can improve their practical and problem-solving abilities. This teaching method can help students establish the connection between theory and practice to be more transparent about the learning objectives.

In addition to teaching basic knowledge, some innovative and exploratory teaching content can also be added. For example, some open questions or projects can be set up to allow students to conduct research and exploration independently. This way can cultivate students' innovative thinking and autonomous learning abilities and lay a solid foundation for their future career development.

By optimizing and improving the teaching content of engineering drawing courses at Wuzhou University, high-quality engineering and technical talent can be better cultivated in line with social needs. Implementing these measures will help improve students' learning interests and practical abilities and lay a solid foundation to achieve better results in their future careers.

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6. Teaching Method Innovation

In today's information age, introducing modern technology is crucial to improving teaching quality. For engineering drawing courses, these technologies can help students understand complex graphics and design concepts more intuitively.

The use of multimedia teaching resources is a significant example. Through online teaching platforms, teachers can publish rich teaching materials such as videos and PPTs for students to learn anytime and anywhere. It breaks the limitation of time and space so that students can conduct in-depth study according to their learning progress and interests. Offline practical operations complement online teaching so that students can consolidate and apply the knowledge they have learned in practical operations.

Virtual reality technology has introduced a new teaching method for engineering drawing courses. Through virtual reality equipment, students can feel the actual engineering design environment in an immersive way. It improves students' participation and greatly enhances their sense of experience. This immersive teaching method helps students understand all aspects of engineering design more intuitively, improving the learning effect.

The application of big data analysis in teaching is also increasingly widespread. By analyzing students' learning behavior and effects, teachers can more accurately understand each student's learning situation and needs so they can provide students with personalized teaching programs. This precise teaching method helps improve students' learning efficiency and helps teachers continuously optimize and adjust teaching content and strategies.

7. Innovation of Teaching Strategies

In addition to introducing modern teaching technology, innovative teaching strategies are the key to improving the teaching quality of engineering drawing courses. Case teaching is an efficient teaching strategy. Combining theoretical knowledge with practical cases helps students deepen their understanding of theoretical knowledge in solving practical problems. This teaching method can improve students' practical abilities and cultivate innovative thinking and problem-solving abilities.

Project-driven teaching is a more comprehensive teaching strategy. In this teaching mode, students must complete a practical engineering project in groups. It requires students to have solid theoretical knowledge and good teamwork and communication skills. By implementing the project, students can continue to learn and grow in practice and better adapt to future career development.

The flipped classroom is another teaching mode worth trying. In this mode, students must master basic knowledge by autonomous learning before class, while classroom time is mainly used to discuss and solve problems. This teaching method can improve students' initiative and participation in thinking and communicating more actively in the classroom.

Competition teaching is also an effective incentive mechanism. Organizing various competition activities, such as engineering drawing design competitions, can stimulate students' learning interests and enthusiasm. This teaching method can improve students' professional skills and cultivate their sense of competition and teamwork.

8. Conclusions

Strengthening practical teaching is particularly important in reforming engineering drawing courses. Teachers must make efforts in class hour arrangement, content design, and school-enterprise cooperation to improve students' practical abilities effectively.

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Increasing the class hours of practical teaching is the basis for improving practical ability. Traditional engineering drawing courses focus on theoretical teaching while ignoring the importance of practical teaching. Therefore, teachers need to re-adjust the proportion of class hours to ensure that practical teaching occupies a sufficient proportion. By increasing the class hours of practical teaching, students can have more time and opportunities to carry out practical operations so that they can understand and master the knowledge and skills of engineering drawing more deeply.

Enriching the content of practical teaching is also the key. Teachers can set up more practical operation projects and cases closely related to engineering practice so that students can learn and apply their knowledge of engineering drawing in practice. These projects and cases can cover different engineering fields and practical application scenarios, helping students build a comprehensive knowledge system and practical abilities.

Strengthening cooperation with enterprises and establishing off-campus practice bases are important ways to improve practical ability. Through cooperation with enterprises, universities can provide students with a real engineering environment and practical work tasks to learn and grow in practice. This school-enterprise cooperation model can help students better understand the industry's needs and standards and lay a solid foundation for their career development.

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