RESEARCH ARTICLE

A Study on the Application of Digital Classroom Teaching in Automotive Specialized Courses in Vocational Undergraduate Colleges and Universities

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Abstracts: With the continuous development of information technology, digital education shows great application potential in the field of education. In the automotive professional courses of vocational undergraduate colleges, digital classroom teaching, as an innovative educational model, provides students with more flexible and diverse learning methods and a more realistic learning situation, which is crucial to the teaching of automotive professional courses, which requires teachers of automotive professional courses in vocational undergraduate colleges to pay great attention to digital classroom teaching. The article analyzes the challenges that may be faced in the process of digital classroom teaching and puts forward corresponding coping strategies, to improve the teaching quality of automotive majors in vocational undergraduate colleges through digital classroom teaching.

Keywords: digital classroom teaching; vocational undergraduate colleges; automotive professional courses; application

Introduction

Traditional classroom teaching is often limited by time and space, which cannot provide students with enough practice opportunities and diverse learning resources. In this situation, digital classroom teaching emerges as a compelling solution. Digital education provides students with a brand new learning environment, which can create more diversified learning opportunities and practical experiences through online courses, virtual experiments, and interactive platforms. For automotive majors in vocational undergraduate colleges and universities, digital teaching can simulate real automotive maintenance and diagnosis scenarios in virtual environments through virtual reality and augmented reality technologies, allowing students to perform actual operations in virtual environments and improve their practical skills, to cultivate all-rounded talents.

1. The importance of digital classroom teaching in the application of automotive professional classes in vocational undergraduate colleges and universities

1.1 Can provide students with a richer and more diverse learning experience

The application of digital classroom teaching in automotive professional courses in vocational undergraduate colleges and universities provides students with a richer and more diverse learning experience, which greatly enhances their learning motivation and growth potential. Traditional teaching methods can not fully meet the needs of automotive students in knowledge acquisition and skill development, and digital teaching has injected new vitality into the teaching of automotive courses in vocational undergraduate colleges through technological innovation and educational change. In the digital classroom, there are various teaching

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resources, so that students can jump out of the limitations of traditional textbooks and have more diversified learning resources, and students can acquire knowledge through online courses, experimental simulation, multimedia materials, and other forms. Especially in the automotive field, digital teaching can provide a wealth of 3D models, video demonstrations, and virtual experiments, so that students can experience the structure and working principles of automobiles, increasing the intuition and practicality of knowledge. Meanwhile, digital classroom teaching encourages students to engage in interactive and cooperative learning. Through online discussions, real-time Q&A, and team projects, students can more easily communicate and collaborate with their peers and teachers. This interaction promotes idea collision, knowledge sharing, and problem-solving, and develops students' teamwork and communication skills, which is especially important in the automotive field, where teamwork is essential in automotive engineering projects. Digital classroom teaching provides students in automotive specialized courses in vocational undergraduate colleges and universities with a new learning experience, enriches their access to knowledge, develops more diversified abilities, and helps them to better adapt to the development and changes in the automotive industry (Li, 2023).

1.2 Helping to realize students' personalized learning and independent learning

Each student has differences in knowledge absorption and understanding, and the traditional one-size-fits-all teaching model makes it difficult to meet the needs of all students, whereas digital teaching allows students to arrange their learning according to their interests, strengths, and pace by providing personalized learning paths, resources, and tasks. This personalized approach to learning makes students more engaged and more likely to stay motivated, resulting in better learning outcomes. Digital classroom teaching emphasizes the ability of students to learn independently, whereas in traditional teaching, students may rely more on teachers' guidance and scheduling. However, the ability to learn on one's own is an important quality in a real career. By guiding students to acquire, organize, and apply knowledge on their own, digital teaching develops their ability to think independently, problem-solve, and self-manage. Students can independently choose what, when, and how to learn, thus becoming more confident and autonomous in practical applications. This teaching mode is not only a means of knowledge transfer but also a powerful tool to stimulate students' inner potential and cultivate independent learning habits.

1.3 Being able to closely integrate school education with industrial needs

The application of digital classroom teaching in automotive professional classes in vocational undergraduate colleges helps to closely integrate school education with industrial demand, so that students can better adapt to and integrate into the actual working environment of the automotive industry, and this close integration not only improves the quality of teaching, but also creates more opportunities and advantages for students' career development. Through cooperation with the automotive industry, teachers can introduce the latest industry news, technological developments, and market trends into the classroom. Students can learn about the latest changes and challenges in the current automotive industry through online resources and digitized materials, thus better preparing themselves for their future career paths. Meanwhile, digital teaching has introduced technologies such as virtual reality (VR) and augmented reality (AR) in vocational undergraduate colleges and universities, which can achieve more realistic simulation of automotive maintenance, diagnosis, and testing scenarios, which not only allows students to operate practically in virtual environments, but also simulate the solution of real problems, and this simulation of actual operation can better develop students' practical skills and make them more equipped after graduation with the ability to enter the workplace directly, which helps to cultivate more competitive automotive professionals and provides strong support and promotion for the sustainable development of the

automotive industry (Gao et al, 2022).

2. Challenges faced by the application of digital classroom teaching in automotive professional classes in vocational undergraduate colleges and universities

2.1 Problems in the construction of technical facilities and faculty members

There are some challenges in applying digital classroom teaching to automotive professional courses in vocational undergraduate colleges, one of which is the problem of technical facilities and faculty construction. Digital classroom teaching requires the support of advanced computers, network equipment, interactive whiteboards, virtual laboratory equipment, etc. However, some vocational undergraduate colleges and universities may have an insufficient investment in technical facilities to ensure that all students can access and use digital teaching resources smoothly, which requires the updating and maintenance of hardware equipment, which involves a variety of issues such as funding, technology, and management. Developing a faculty with digital teaching capabilities is also one of the challenges (Yu, 2020). Traditional teacher training and quality may not be sufficient to support the requirements of digital teaching and learning, and teachers need to adapt to new teaching modes, become proficient in the use of educational technology tools, design and organize digital courses, as well as guide students in online interactions. Institutions therefore need to invest time and resources in training teachers to enhance their digital teaching skills and awareness.

2.2 Cultivation of Students' Independent Learning Skills

Although digital teaching provides students with greater learning flexibility and resourcefulness, it may also lead to problems such as insufficient self-management and distraction in the learning process. A notable challenge is that students may become overly reliant on teachers' guidance and prompts and lack active learning motivation. In traditional teaching, teachers usually play the main role of knowledge transfer, whereas in digital teaching, students need to acquire, organize, and apply knowledge from information more often (Zhang et al, 2022). Therefore, it becomes crucial to develop students' independent learning skills. Schools need to encourage students to actively participate in lessons, initiate learning and discussions, as well as grow accustomed to independent thinking and problem-solving. Digital classroom teaching often requires students to arrange their learning plans and set learning goals, which requires them to have clear learning objectives, planning, and execution skills. Schools can help students develop these important skills by guiding them to make learning plans, providing time management skills, and sharing success stories.

2.3 Responding to Data Privacy and Security Issues

With the increased use of online learning platforms, virtual lab tools, and cloud-based storage, students' and teachers' personal information, learning data, and educational resources may be at risk of data leakage, misuse, and infringement. Digital classroom teaching involves students' and teachers' personal information, learning records, and other sensitive data. Leakage of such data may lead to compromised personal privacy and may even be used for inappropriate purposes. Schools and educational institutions need to establish strict data privacy policies and protection measures to ensure the security of data collection, storage, and transmission, as well as to strengthen data privacy awareness education for teachers and students. The intellectual property and copyright issues of educational resources also need to be emphasized. In digital classroom teaching, teachers may use a variety of digital educational resources, such as textbooks, videos, and courseware, however, these resources may involve copyright issues, especially in terms of sharing and reuse. Teachers and schools need to clarify the ownership of intellectual property rights, the scope of use, and the licensing methods of educational resources to avoid infringement problems (Peng et al, 2015).

3. Application Strategies of Digital Classroom Teaching in Automotive Specialized Courses in Vocational Undergraduate Colleges and Universities

3.1 Application of online courses and learning platforms

Online courses and learning platforms provide students with a flexible learning environment and also provide teachers with more teaching resources and interactive opportunities. The introduction of online courses can break the limitations of time and space, and students can participate in learning anywhere according to their schedule, without being constrained by the location and time of traditional classrooms. Especially for students in vocational undergraduate colleges and universities, who may face the pressure of studying and working at the same time, online courses can better adapt to their learning needs (Li et al, 2023). The online learning platform can provide diverse learning resources, and teachers can upload various forms of learning materials such as courseware, teaching videos, virtual experiments, and case studies on the learning platform. Students can choose learning resources according to their interests and learning progress, to better meet their learning needs. This diversity can enhance the interest and flexibility of learning. In addition, the learning platform also supports interactive and cooperative learning. Teachers can set up online discussion boards on the platform where students can participate in discussions and ask questions, which helps give students more space and time for independent learning and enhance their knowledge. The introduction of online courses and learning platforms is an important application strategy for digital classroom teaching in automotive courses in vocational undergraduate colleges and universities, which not only meets the needs of students for flexible learning, but also provides more teaching resources and interactive opportunities, and promotes in-depth learning and active participation of students.

3.2 Application of virtual reality and augmented reality technology in practical training

Virtual reality and augmented reality technology can provide students with a more realistic learning experience and help them better understand and master the practical skills of automobile maintenance, diagnosis, and testing. In the actual teaching process virtual reality technology can simulate a real automobile working environment, so that students can carry out a variety of repair and operation exercises in virtual reality. By wearing VR helmets, students can enter a virtual automobile repair store or workshop to carry out virtual automobile repair and diagnosis. They can operate virtual tools, check the engine, disassemble parts, and simulate various failure situations to exercise their problem-solving and practical operation skills. Augmented reality technology can superimpose virtual elements in the real environment to create a richer learning experience for students. With AR applications, students can use smart devices, such as cell phones or AR glasses, to display virtual car parts or illustrative diagrams of an actual car. This real-time overlay effect can help students better understand the structure and working principles of the car, thus improving their cognitive and operational skills (Chen, 2017).

3.3 Implementing data-driven personalized learning

Being able to collect and analyze student learning data in digital classroom teaching allows for learning paths and resources to be tailored for each student, thus improving learning outcomes and satisfaction. Data-driven personalized learning can customize learning content according to students' learning styles and interests, and by analyzing students' learning histories, behavioral patterns, and learning preferences, the system can recommend courses, materials, and activities that are suitable for them (Zhu, 2014). For automotive courses, different students may be interested in different fields, and personalized learning can meet their different academic needs. Meanwhile, data analytics can help teachers better understand students' learning progress and difficulties so that they can provide targeted guidance and support. Teachers can use learning

analytics tools to identify which knowledge points students are struggling with and which areas need more review and reinforcement. This enables teachers to provide more targeted tutoring and answers in the classroom to help students better overcome their learning challenges. In addition, data-driven personalized learning can also provide timely feedback and assessment mechanisms. Students can assess their learning progress through online quizzes, assignments, and lab simulations, and the system will adjust their learning plans and recommendations based on their performance and progress.

Summarize

In summary, the application of digital classroom teaching in automotive professional courses in vocational undergraduate colleges and universities provides students with a richer and more diverse learning experience, helps to closely integrate school education with industrial needs, and cultivates students' personalized learning and independent learning ability. Strategies such as the application of online courses and learning platforms, the application of virtual reality and augmented reality technology in practical training, and the implementation of data-driven personalized learning can be adopted in the process of practical application to enhance students' practical ability and adapt to industrial changes, as well as to promote the sustainable development of automotive professional education.

Conflict of Interest

The authors declare that they have no conflicts of interest to this work.

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