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Exploration of Practical Course Teaching Reform in the Intelligent Era

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Abstract

With the advent of the intelligent era, the rapid development of technology presents new challenges and opportunities for practical courses. This paper analyzes the characteristics and needs of practical courses in the intelligent era, explores the existing problems in current practical course teaching, and proposes corresponding teaching reform measures from the aspects of teaching philosophy, teaching content, teaching methods, and teaching evaluation. The aim is to improve the teaching quality of practical courses and cultivate innovative talents that meet the demands of the intelligent era.

Keywords

Intelligent Era; Practical Courses; Teaching Reform; Innovative Talents.

1. Introduction

With the rapid development of technology, we have entered the intelligent era. Emerging technologies such as artificial intelligence, big data, and the Internet of Things are profoundly changing people's lifestyles, work patterns, and the operational mechanisms of society [1]. In this era full of opportunities and challenges, education, as a crucial force in cultivating talent and promoting social progress, is also facing unprecedented transformations [2-4].

Practical courses, as an essential component of the education system, play a vital role in developing students' hands-on abilities, innovative thinking, and problem-solving skills. However, under the backdrop of the intelligent era, traditional practical course teaching models are gradually revealing some shortcomings. For instance, the teaching content may lag behind technological advancements, failing to cover emerging technologies and applications in a timely manner; the teaching methods may be relatively monotonous, making it difficult to stimulate students' interest and creativity; the teaching evaluation system may be inadequate, unable to comprehensively and accurately reflect students' practical abilities and overall qualities [5-10].

To better meet the demands of the intelligent era and cultivate high-quality talents with innovative spirit and practical abilities, there is an urgent need to deeply explore the reform of practical course teaching. By updating teaching philosophies, optimizing teaching content, innovating teaching methods, improving the teaching evaluation system, and strengthening the construction of the teaching staff, we can provide students with higher-quality practical course teaching, enabling them to possess stronger competitiveness and adaptability in the intelligent era [11-15].

This study aims to deeply analyze the problems and challenges faced by practical course teaching in the intelligent era and propose feasible reform plans to provide valuable references and insights for promoting the innovative development of practical course teaching.

2. Current Problems in Practical Course Teaching

Practical courses play a crucial role in developing students' hands-on abilities, innovative thinking, and problem-solving skills. However, there are still some issues in current practical

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course teaching that hinder the improvement of teaching quality and the development of students' overall qualities.

2.1. Teaching Content

Outdated Content: Some practical course teaching content has not kept pace with technological advancements and societal needs, resulting in outdated and obsolete content. For example, in computer-related practical courses, some textbooks and teaching cases remain at the technological level of several years ago, while current computer technology is rapidly evolving with new programming languages, development tools, and application scenarios constantly emerging, leading to a disconnect between what students learn and actual applications.

Lack of Systematic Approach: The teaching content of practical courses often lacks systematic and coherent connections between different experimental projects. Students find it difficult to form a complete knowledge system and practical abilities. For instance, in electronic circuit experimental courses, different projects may involve knowledge of analog circuits, digital circuits, and integrated circuits, but the connections between these projects are not tight enough, making it hard for students to integrate the knowledge they have learned.

2.2. Teaching Methods

Teacher-Centered Approach: In current practical course teaching, there is still a teacher-centered teaching model. Teachers dominate the classroom, and students passively receive knowledge and skills. This teaching model lacks interactivity and inspiration, making it difficult to stimulate students' interest in learning and innovative thinking. For example, in mechanical processing experimental courses, teachers often demonstrate operations first, and then students imitate the steps, lacking opportunities for independent exploration and innovation.

Monotonous Teaching Methods: The teaching methods of practical courses are relatively monotonous, mainly focusing on experimental demonstrations and operational guidance. This teaching method fails to meet the diverse learning needs and interests of students and is not conducive to developing students' comprehensive abilities. For example, in chemistry experimental courses, teachers usually explain experimental principles, demonstrate experimental steps, and then students perform the experiments, lacking the cultivation of students' experimental design abilities, data analysis abilities, and problem-solving abilities.

2.3. Teaching Resources

Insufficient Experimental Equipment: Some schools have relatively scarce teaching resources for practical courses, with insufficient and outdated experimental equipment, making it difficult to meet students' practical needs. For example, in physics experimental courses, some schools have aging and severely damaged experimental equipment, affecting the accuracy and reliability of experiments. Additionally, due to the limited number of experimental equipment, students need to wait in line during experiments, wasting a lot of time.

Lack of Integration of Teaching Resources: Teaching resources for practical courses are scattered across different departments and teachers, lacking effective integration and sharing. This makes it difficult for students to access comprehensive and systematic teaching resources during their learning process and is not conducive to communication and cooperation among teachers. For example, in engineering practical courses, teachers from different specialties may have different experimental equipment and teaching cases, but these resources are not effectively integrated and utilized, leading to a waste of teaching resources.

3. Reform Measures for Practical Course Teaching in the Intelligent Era

With the advent of the intelligent era, the rapid development of technology poses new challenges and requirements for practical course teaching. To adapt to the development of the

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intelligent era and cultivate high-quality talents with innovative spirit and practical abilities, it is necessary to reform practical course teaching.

3.1. Updating Teaching Philosophy

In the intelligent era, the reform of practical course teaching needs to update the teaching philosophy from the following aspects:

a) Student-Centered Approach

The reform of practical course teaching needs to establish a student-centered teaching philosophy, fully leveraging students' active roles, and allowing them to learn, explore, and innovate actively in practice.

Focus on Students' Needs and Interests: When designing practical course teaching content and methods, fully consider students' needs and interests. Use surveys, interviews, and other methods to understand students' interests and learning needs, and then adjust teaching content and methods based on their feedback.

Encourage Independent Learning: In practical course teaching, encourage students to learn independently and develop their independent learning abilities. Provide rich learning resources and set independent learning tasks to help students master knowledge and skills through self-directed learning.

Emphasize Individual Differences: Each student has unique characteristics and strengths. In practical course teaching, pay attention to individual differences and teach according to their abilities. Use differentiated teaching and personalized tutoring to meet the diverse learning needs of students.

b) Emphasize the Cultivation of Practical Innovation Abilities

The intelligent era requires talents with practical innovation abilities. Therefore, the reform of practical course teaching needs to focus on cultivating students' practical innovation abilities, which include the ability to discover, analyze, and solve problems in practice, as well as innovative thinking and methods.

Design Innovative Practical Projects: In practical course teaching, design innovative practical projects to train students' innovative thinking and methods. Practical projects can come from real-life problems or cutting-edge technology fields, allowing students to improve their practical innovation abilities by solving these problems.

Encourage Participation in Research Projects and Innovation Activities: Encourage students to participate in research projects and innovation activities, exposing them to cutting-edge technology and innovative thinking. Organize students to participate in research projects and innovation competitions to stimulate their enthusiasm and potential for innovation.

Cultivate Team Collaboration Skills: In practical course teaching, cultivate students' team collaboration skills, enabling them to learn communication, cooperation, and coordination in a team, thereby enhancing their practical innovation abilities. Organize students to participate in team projects and competitions to develop their team collaboration spirit and skills.

c) Strengthen the Application of Information Technology

The development of information technology in the intelligent era brings new opportunities and challenges for practical course teaching. Therefore, the reform of practical course teaching needs to strengthen the application of information technology, deeply integrating it with practical course teaching to improve the quality and efficiency of teaching.

Enrich Teaching Resources with Information Technology: Use information technology to enrich teaching resources, such as online courses, virtual laboratories, and instructional videos, allowing students to acquire knowledge and skills in various learning environments.

Innovate Teaching Methods with Information Technology: Use information technology to innovate teaching methods, such as flipped classrooms, blended learning, and online teaching,

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enabling students to improve their learning outcomes through more flexible learning approaches.

Enhance Teaching Management Efficiency with Information Technology: Use information technology to enhance teaching management efficiency, such as teaching management systems, online examination systems, and grade management systems, making teaching management more scientific, standardized, and efficient.

3.2. Optimizing Teaching Content

In the intelligent era, the teaching content of practical courses needs continuous optimization to adapt to new technological developments and talent demands. Here are some methods to optimize practical course teaching content:

a) Keep Up with Technological Frontiers

Updated with Industry Trends: Teachers and course designers should closely follow the developments in emerging technology fields such as artificial intelligence, big data, the Internet of Things, and block-chain. Attend industry conferences, seminars, and read professional journals and technical blogs to stay informed about the latest technological trends, application cases, and research outcomes.

Introduce Cutting-Edge Technologies: Incorporate the latest technological achievements into the teaching content of practical courses. For example, in computer science-related practical courses, include the implementation of AI algorithms, the use of big data analysis tools, and the application of blockchain technology. In engineering practical courses, introduce advanced technologies such as smart sensors, automated control systems, and 3D printing.

Case Studies: Select representative cases of intelligent era technology applications for analysis, allowing students to understand the application scenarios and problem-solving methods of these technologies in practice. For instance, analyze the design and implementation of smart home systems, the operational principles of intelligent traffic management systems, and AI-assisted diagnosis in the medical field.

b) Strengthen Interdisciplinary Integration.

Integrating Multidisciplinary Knowledge:Problems in the intelligent era often require the comprehensive application of knowledge from multiple disciplines. Therefore, the teaching content of practical courses should break traditional disciplinary boundaries and integrate knowledge from computer science, mathematics, physics, engineering, biology, and other fields. For example, in designing a practical course on intelligent robots, it can integrate mechanical engineering, electronic engineering, computer programming, and artificial intelligence.

Offering Interdisciplinary Courses:Schools can offer interdisciplinary practical courses such as "Artificial Intelligence and Biology," "Big Data and Finance," "Internet of Things and Urban Planning," etc. These courses allow students to develop comprehensive thinking and innovative abilities in an interdisciplinary learning environment.

Project-Driven Teaching:Use actual projects as carriers to guide students in comprehensively applying knowledge and skills from different disciplines to solve problems. For example, involving students in a smart agriculture project would require knowledge of sensor technology, data analysis, automation control, and biology. Through the implementation of the project, students can better understand the integration and application of interdisciplinary knowledge.

c) Customizing Personalized Learning Content

Learning Needs Analysis: Before the course begins, analyze students' learning backgrounds, interests, and career plans to understand their personalized learning needs. Based on the different needs of students, customize personalized learning content and practical projects for them.

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Autonomous Selection of Learning Content: In practical course teaching, provide diverse learning content and practical projects, allowing students to choose according to their interests and abilities. For example, in a data science practical course, offer different directions such as data analysis, data visualization, and machine learning. Students can choose one or more projects based on their interests.

Differentiated Teaching: Conduct differentiated teaching based on students' learning progress and ability levels. For students with strong learning abilities, provide more challenging learning content and practical projects; for students who find learning difficult, offer additional tutoring and support.

3.3. Innovating Teaching Methods

In the intelligent era, practical courses can innovate teaching methods through the following ways:

a) Inquiry-Based Teaching Method

Posing Questions:Teachers pose thought-provoking questions based on the course content to guide students in thinking and inquiry. The questions can be open-ended without fixed answers, encouraging students to think from different perspectives. For example, in an artificial intelligence practical course, a question like "What is the impact of artificial intelligence on future society?" can be posed.

Independent Inquiry:Students, in groups or individually, conduct inquiries through literature review, experiments, discussions, etc. During the inquiry process, students independently learn relevant knowledge and skills, developing independent thinking and problem-solving abilities.

Sharing Results:Students organize and summarize their inquiry results and share them in the form of reports, presentations, etc. During the sharing process, students can learn from each other, broaden their horizons, and deepen their understanding of knowledge.

Teacher Evaluation:Teachers evaluate students' inquiry results, affirming their efforts and innovations, pointing out existing problems and deficiencies, and providing suggestions for improvement. Teachers' evaluations can motivate students to continue in-depth inquiry and enhance their learning enthusiasm.

b) Experiential Teaching Method

Creating Contexts:Teachers create real or simulated contexts for students to experience the process of solving actual problems. The contexts can be laboratories, enterprise sites, virtual environments, etc. For example, in an engineering practical course, a construction site context can be created for students to experience engineering design and construction management processes.

Practical Operations:Students perform practical operations in the context, experiencing the application of knowledge and the mastery of skills firsthand. Practical operations can include experiments, simulation exercises, actual project implementation, etc. Through practical operations, students can deepen their understanding of knowledge and improve their practical abilities.

Reflection and Summary:After practical operations, students reflect on and summarize their experiences. Reflection can include the gains from the practice process, encountered problems, and methods for solving problems. Through reflection and summary, students can transform practical experiences into knowledge and skills, enhancing learning outcomes.

Extended Application:Teachers guide students to extend and apply the knowledge and skills experienced in the context to other fields or actual problems. Through extended application, students' innovation and transfer abilities can be cultivated.

c) Application of Intelligent Teaching Aids

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Virtual Laboratories:Use virtual laboratory software to allow students to perform experimental operations in a virtual environment. Virtual laboratories can provide realistic experimental scenarios and equipment, enabling students to operate through a mouse and keyboard, observe experimental phenomena, and record experimental data. Virtual laboratories can improve the safety and repeatability of experiments and reduce costs.

Intelligent Tutoring Systems:Use intelligent tutoring systems to provide personalized learning support for students. Intelligent tutoring systems can offer targeted learning suggestions and resource recommendations based on students' learning situations and needs. These systems can also use artificial intelligence technology to automatically grade assignments and answer questions, improving teaching efficiency.

Data Analysis and Feedback:Use data analysis technology to collect students' learning data, such as learning time, progress, and assignment completion. By analyzing learning data, teachers can understand students' learning situations and problems, adjusting teaching strategies in a timely manner. Teachers can also provide feedback to students based on the analysis results, helping them understand their learning situations and adjust their learning methods.

4. Conclusion

The reform of practical course teaching in the intelligent era is an inevitable requirement of the times and an important way to improve the quality of talent cultivation. We must fully recognize the importance and urgency of practical course teaching reform, actively explore effective ways and methods for reform, continuously update teaching philosophies, optimize teaching content, and innovate teaching methods to improve the quality of practical course teaching and cultivate innovative talents that meet the demands of the intelligent era. In the process of practical course teaching reform, continuous exploration and innovation are needed to adapt to the development and changes of the intelligent era.

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