Reform and Practice of "Classroom Revolution" based on the Application of Mechatronics System of New Generation Information Technology

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Abstract: The new generation of information technology has brought tremendous transformative momentum to traditional teaching models. This article proposes a three-stage and three-level closed-loop classroom-teaching model that meets the needs of information technology, professional competence standards, and requirements. It realizes the synchronization of teacher teaching and application, the integration of student learning and application, and the combination of virtual and reality. It also diversified the infiltration and education, providing help for students to complete three-dimensional and comprehensive learning and training closed-loop, and promoting the improvement of the quality of higher vocational education.

Keywords: New Generation Information Technology; Classroom Revolution; Skills Enhancement; Technological Innovation

1. Introduction

The rapid development of the new generation of information technology is causing fundamental changes in traditional educational models, teaching methods, and teaching methods. Many experts and scholars have conducted relevant research on the integration of classroom teaching with the new generation of information technology. Cheng et al (2021) [1] introduced the pensions of new generation information technology and sustainable development of Regional economy. Cui and Wang (2021) [2] mentioned the tntegration of new generation information technology and vocational education informatization.Hu et al (2023), and Xia (2021) [3, 4] made research on classroom smart teaching. Li and Tian (2023), Li, et al (2022) [5, 6] raises blended teaching mode or information technology revolution. But there are still many problems. For example, further exploration is needed to screen and organize classroom data, effectively extend classroom evaluation, and effectively integrate online and offline.

1.1 Professional Characteristics and Talent Cultivation Requirements

Cultivation of engineering college students, training of skills, the application of mechatronics system as the core curriculum of electromechanical majors, cultivate ideals and beliefs, moral and ability, mastery of knowledge and technical skills related to intelligent manufacturing, equipment manufacturing and other industries, able to engage in mechatronics product production and adjustment, high-end mechatronics equipment, operation and maintenance, robot assembly and operation of the work of the composite, innovative and technical skills.

1.2 Spiritual Connotations Mainline

This paper focuses on the national development needs of a strong intelligent manufacturing country, combined with the spirit of the 20th National Congress, through the deep excavation and refinement of the values and spiritual connotations contained in the knowledge system of the course, this course with the theme of "cultivating scientific thinking, establishing technological self-confidence, and consolidating the awareness of energy conservation and environmental protection", with the main line of patriotic sentiments (responsibility to bear the world of the family country) - to - To the strong national action (the pursuit of excellence, craftsmanship) --- to the national aspiration (unrelenting struggle without fear of hardship) as the main line, capacity building, personality

development, value-led one-stop completion. This will enable students to meet the standard of highly skilled personnel while mastering the professional knowledge of mechatronics system application courses.

2. Curriculum Civics Themes, Main Lines and Core

2.1 Orientation and Focus of the Programme's Curricular Development

We will discuss the present with the past, feel the history from the generation of mechatronics technology, grasp the present from the application of mechatronics system, and take the national renaissance as our own responsibility to the future from the development of the application of mechatronics system together.

2.2 Objectives of the Course's Civic and Development

The new generation of information technology promotes the quality improvement of higher vocational education. This course proposes a three-phase and three-level closed-loop large classroom teaching mode that adapts to the demand of information technology, meets the standard of vocational competence, and satisfies the requirements of thoughts, as shown in Figure 1, which realizes synchronous teaching and use by teachers, integration of learning and use by students, integration of virtual and real modes, and provides a three-dimensional and comprehensive assistance to students to complete the closed-loop learning and cultivation.
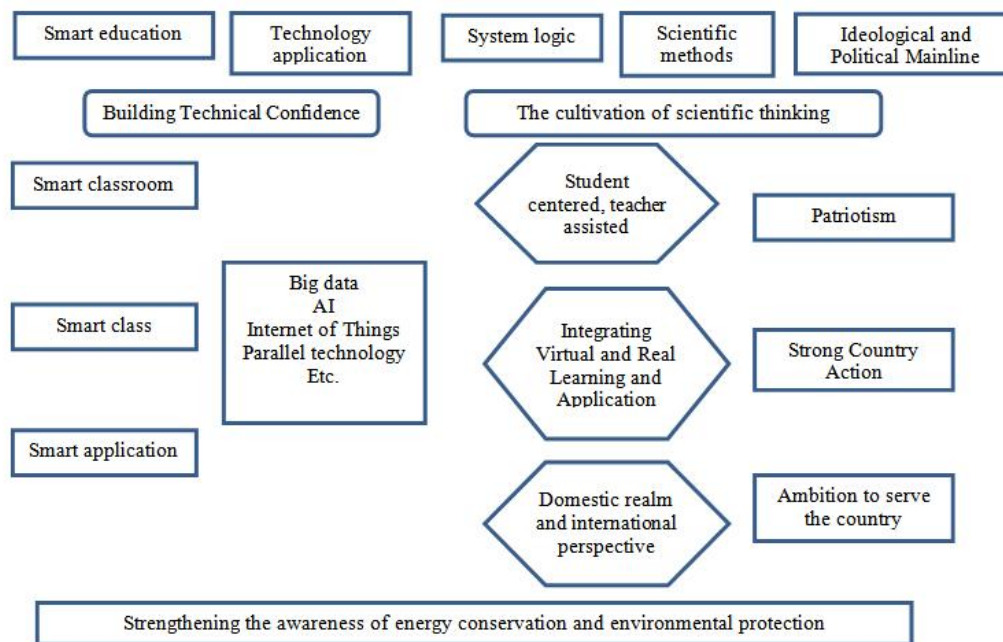

Figure 1 Three-stage, Three-level Closed-loop Large Classroom Model

2.3 Supply of Content for Curriculum

From the three dimensions of time, space and soul, reflecting Chinese fashion, Chinese science and technology, and Chinese self-confidence through the application of new-generation information technology in the curriculum. With the application of information technology such as cloud, object, big, smart and mobile, we create an all-round, multi-form, all-embracing environment for educating people.

3. Course Civic and Construction Mode

Combined with the orientation of school running, the characteristics of mechatronics majors and the characteristics of the courses, the syllabus was revised to determine the objective of cultivating civic and cultivation through the course to promote Chinese culture, enhance technological self-confidence, and broaden the international outlook, and the teaching plan of the loose-leaf course was constantly improved, and new-generation information technology and other information technologies were integrated into the classroom teaching. Through a series of

scientific worldviews and methodologies, the Mechatronics System Application course cultivates a rigorous scientific attitude and the courage to be self-reliant and self-improving, so that students can feel the power of China.

3.1 Methodological Path

Mechatronics system applications and other courses and resources are not necessarily stereotypical dogma, not necessarily intentional sensationalism, but also can be a beautiful poem that moves the heartstrings of the sentence, can be to the vast and subtle Chinese festivals, can be a beautiful shape, changing the infinite elegant Chinese characters, can be a multi-element fusion of Chinese characteristics of multi-ethnic cultures. This course is based on the concept of "Think, Teach, Ease, Lead, Learn".

3.2 Other Recommendations

Reconstruct the traditional course content, classify and sort out the elements of Civics, and incorporate them into each task and link of integrated teaching article by article, so that the historical classics and modern science and technology can achieve the collision and fusion, and the traditional culture can achieve the in-depth combination of traditional culture and advanced technology. Keeping Chinese history in mind with the past of mechatronics system, uniting Chinese knots with major events such as 3D printed Zhaozhou Bridge, Shenzhou manned spaceship, and Winter Olympics smart restaurant, gathering Chinese hearts with the Implementation Programme of National Vocational Education Reform, Action Plan of Vocational Education for Improvement and Excellence, and Opinions on Promoting the High-quality Development of Modern Vocational Education, and taking robots dancing in Chinese dance, and the backward chip industry as an opportunity to We will build up China's strength, and strive to develop China's soul with virtual reality and ground and air collaboration, and embody the most beautiful China's love with digital twins and parallel time and space.

We create a "five thinking, four action" course teaching mode, help to achieve education, skills enhancement. Mechatronics system application course five modules of increasing difficulty, content upgrading, scientific use of innovative thinking, precision thinking, dialectical thinking, systems thinking, strategic thinking and other scientific thinking, teaching module "to innovative thinking to add vitality, precision thinking to improve the effectiveness of the dialectical thinking to increase the wisdom of the system thinking to gather strength, strategic thinking for the long term! The teaching module "adds vitality with innovative thinking, enhances effectiveness with precise thinking, gathers strength with dialectical thinking, and seeks the long term with strategic thinking", and the learning task "increases in difficulty", through the setting of teaching knowledge points with extreme details, so that the students can get timely results for each completed link, and constantly realize "cyclic feedback", so that the students can be constantly "motivated by goals". "Target motivation", so as to obtain a pleasant "heart flow harvest", stimulate students to upgrade their skills, through the four stimulating action to motivate students to enter the infinite mode of learning independently.

It is the first to create a new form of Civic that integrates the virtual and the real - parallel Civics. Using a new generation of information technology, it makes online skills teaching and online possible, breaks through the bottleneck of traditional, and creates the possibility of diversified teaching. Parallel practical training system breaks the simple simulation way of traditional virtual simulation technology, surpasses the stereotypical virtual of digital twin, and can solve the problems of online practical training teaching and training to a large extent. The teaching mode of virtual reality builds a flexible and open education system, closely integrates the course content with the form of Civics, and forms parallel Civics. It supports fragmented and collaborative learning that is not limited by time and space, and is vertically progressive and horizontally cross-parallel between the virtual and the real, which innovates and improves the reform of Civics teaching.

Four rounds of courses were held in the Smart Vocational Education MOOC Academy. Since the implementation of the construction of course, the students' skill level, craftsmanship, professionalism and innovation ability have been comprehensively improved, and they have won more than 100 awards for participating in vocational college skill competitions and innovation and

entrepreneurship competitions in recent years. A number of students have been named Qilu Craftsman Reserve Talents. High-quality employment of students has been fuelled, and the satisfaction of enterprises with graduates' professional ability and vocational quality such as craftsmanship has been significantly improved compared with the past.

4. Featured Innovations

4.1 Realistic Virtual Combination

Guided by national strategies and industry needs as well as the spirit of the 20th National Congress, using typical applications of mechatronics systems supported by new-generation information technology as cases, discussing the past and traversing the past and present, and integrating science and technology with culture, life, and industry to achieve the highest level of excellence. Inspire knowledge exploration, with developmental thinking, establish professional self-confidence and sense of professional responsibilities, move from personal self-confidence to national self-confidence, and lay a sense of historical mission in the digital era. The first new form of Civics that integrates the real and the virtual - Parallel Civics, which supports fragmented and collaborative learning that is not limited by time and space, progressing vertically in a sequential manner, and horizontally crossing the real and the virtual in parallel.

4.2 Five Thinking and Four Action

Create a "five thinking, four action" course teaching mode, helping to achieve education and skills upgrading. The five modules of the mechatronics system application course are increasing in difficulty and upgrading in content, "adding vitality with innovative thinking, enhancing effectiveness with precise thinking, increasing wisdom with scientific thinking, gathering strength with systematic thinking, and seeking the long term with strategic thinking", and the learning tasks are "increasing in difficulty". The learning tasks are "increasing in difficulty", and through the setting of teaching knowledge points with extreme details, students can get timely results for each completed link, and keep realizing "cyclic feedback", so that students can be constantly "motivated by the goal", thus obtaining a pleasant "mental flow". Harvest",

inspire students to upgrade their skills and enter the infinite mode of learning independently.

When teaching the part of "Stepping Motor Application", set up four knowledge points of motor wiring (simple), driver setup (general), PLC wiring (difficult), and programme writing and debugging (more difficult), and obtain the corresponding score and progress (percentile) for each completed item, getting closer and closer to 100%. Encourage the students to take the case of the rotating bench as the goal, motivate them to explore and innovate, and integrate them into the state of joyful learning. This can make students getting enough recognition to stimulate students' autonomy to take the initiative to go to the more difficult modules to break through.

5. Course Evaluation

5.1 Construction of Methodological Mechanisms for Course Assessment and Evaluation

The school has issued the implementation rules for the Civic Reform of Courses to assess the effectiveness of the Civic Teaching Reform of Courses from the level of national development, the level of social service and the level of personal ideals. The Supervisory Group of Civic Reform of this course further refines the assessment and evaluation indexes of the course's Civic assessment, and adopts the mode of regular and random class listening to supervise and assess, so as to ensure that the reform of Civic reform is implemented on the ground. The course teaching evaluation has changed from a single final examination evaluation to a process-oriented assessment, especially transforming the objectives into specific quantifiable or demonstrable learning attitudes, classroom performance, compliance, teamwork, the ability to independently complete the project (task), the ambition to serve the country, vocational literacy, patriotic sentiment, sense of innovation, craftsmanship, sense of social responsibility, participation in online learning, discussion, practical activities, as well as the completion of the course tasks and other process aspects, and putting the course tasks into practice. Course tasks and other process links, the course of the objectives into the evaluation model for assessment, so that the education and course teaching into one.

5.2 Peer and Student Evaluations Inside and Outside the University

Peer Evaluation: Peers from both inside and outside the university work together to formulate assessment and evaluation indexes for the Civics construction of the course, evaluating it in three dimensions: the design of the course, the construction of Civics resources, and Civics classroom teaching. After the evaluation, the experts think that the design of the course is scientific and reasonable, and can be well integrated into the teaching process of the course, and the selection of the Civics resources fits the characteristics of the course, and it is suggested that the Civics resources database should be enriched by adding the topical events in the construction of the resources in the future.

Student Evaluation: The statistical results of the questionnaire survey show that the students' satisfaction with the course's teaching reaches 98%, and the students generally believe that the course not only requires the mastery of professional core skills, but also, more importantly, a deeper understanding of the connotation of the spirit of craftsmanship and an understanding of the socialist core values, social responsibility, and so on.

5.3. Effectiveness of the Civic Teaching Reform of Courses and Demonstration of Radiation

Since the implementation of the construction of curriculum, the students' skill level, craftsmanship, professionalism and innovation ability have been comprehensively improved, and in recent years, they have won more than 30 prizes for participating in vocational college skill competitions and innovation and entrepreneurship competitions. A number of students have been named Qilu Craftsman Reserve Talents. High-quality employment of students has been fuelled, and the satisfaction of enterprises with graduates' professional ability and vocational quality such as craftsmanship has been significantly improved compared with the past.

6. Conclusion

This article mainly explores the combination of education in the curriculum with the new generation of information technology, as well as the methods and approaches to improve the quality of classroom teaching, in order to cultivate key talents.

The depth of Civic Education needs to be further improved. This paper takes the digital and intelligent upgrading of electromechanical majors as the theoretical support, and there are many other points that can be integrated with the Civic Education, so we will dig deeper through professional seminars and other forms in the future to explore more integration points.

Acknowledgments

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