Exploration and Application of Loose Leaf Teaching Material Reverse Engineering and Rapid Prototyping Technology under the Background of "Three Education" Reform

Xiaomin Li

Maoming Vocational and Technical College, 525000, Maoming, China

Abstract: *Based on the background of the "three education" reform, this project explores the application of loose leaf teaching materials of Reverse Engineering and Rapid Prototyping Technology, fully implements the National Vocational Education Reform Implementation Plan, closely combines the four in one talent training goal of "values+knowledge+skills+innovation", and aims at the teaching materials in the "three education" reform task. In the classroom construction research of Reverse Engineering and Rapid Prototyping Technology, combined with the specific situation of the professional students and their own teaching experience, this paper puts forward the application and exploration of teaching materials for the course of Reverse Engineering and Rapid Prototyping Technology. In view of the characteristics of vocational education, one is to change the proportion of theory and practice in the content of teaching materials, strengthen the connection with production and life, highlight the integration of theory and practice, and pay attention to the renewal and change of learning methods by technological development. The second is to improve the form of teaching materials, supplement the classical paper teaching materials with loose leaf teaching materials to new technologies and processes, build new teaching materials, and break through the status quo of traditional teaching materials, to build a complete curriculum teaching system by constantly improving the digital and information resources of curriculum teaching. In addition, through the improvement of loose leaf teaching materials and innovative research on the teaching mode of combining online and offline courses, we can achieve complementary advantages and promote the optimization of curriculum teaching.*

Keywords: "Three Educations" Reform; Loose Leaf Teaching Materials; New Form

1. Introduction

On December 3, 2021, the General Office of the Ministry of Education issued the Notice on Printing and Distributing the "Fourteenth Five Year" Vocational Education Planning Textbook Construction Implementation Plan "(Jiaozhichengting 2021] No. 3), pointing out that the loose leaf teaching material is one of the key directions of the construction of vocational teaching materials in the new era, and it is necessary to design the work manual type and loose leaf type teaching materials with rich pictures and texts and various forms to make up for the oneness of traditional teaching materials. We can actively promote the construction of post course competition certificate textbooks, combine the current apprenticeship system, 1+X certificate system and regulations, and integrate professional skill level certificates, competitions and other standards as well as contents with textbooks, in order to meet the diversified teaching models and education needs, promote the cultivation of students' professional knowledge, professional skills and other knowledge and skills, create new curriculum textbooks, and integrate online resources and offline resources, so as to promote the digital construction of paper textbooks, and make the teaching materials more visible, more interactive and more educational.

Integration of production and education, school enterprise cooperation, the "dual system" of coordinated education is the key to promoting the "three education" reform. Under the requirements of the new era environment, more and more attention has been paid to the connection between college vocational education and enterprise post needs. Therefore, in the efficient vocational education reform, comprehensive factors such as students, schools, and enterprise post needs need to be fully considered, and the cultivation of moral and technical talents required for the post is also the fundamental task of the "three education" reform.

2. The significance of the exploration and application of loose leaf textbooks

The exploration and application of the loose leaf teaching material is the inevitable development direction of the teaching material reform in the vocational education reform, and is also one of the necessary ways to transform the traditional teaching material.

The weaknesses of traditional textbooks. [1] At present, some knowledge and technology in the traditional textbooks of higher vocational colleges are too old, enterprises have been eliminated, and schools are still teaching. [2] With the advancement of higher vocational education reform, the traditional teaching materials can no longer meet the actual needs of current vocational education teaching. The updating speed of traditional teaching materials cannot keep up with the development speed of enterprises and the needs of the society. New processes, new technologies, and new equipment application methods in the actual production of enterprises cannot be entered into the teaching materials in time, which makes the teaching content follow the enterprise technology, and the distance from the actual production is growing. [3] In the traditional teaching materials, the professional content is mainly based on theory and has little practical content, which does not match the educational characteristics of vocational education and practice. Therefore, the characteristics of higher vocational education determine that practical teaching must occupy a large proportion in the process of higher vocational teaching. If the theory occupies too much proportion in the teaching process, the practice is reduced, especially in the production and application cases connected with practice. The content of professional teaching materials is based on theory, combined with practice is rigid, and the method is single. There are some problems in traditional textbooks, such as duplication of content, separation from practice, lack of professional pertinence, and deviation from the demand direction of post orientation in higher vocational education. The traditional textbooks have a long publishing cycle. When they enter the higher vocational teaching class, the content is not enough to keep pace with the times. If they need to be updated, they need to be rearranged and bound before they can be published, which is easy to waste paper resources and does not conform to the concept of green environmental protection advocated by the state.

3. Advantages of loose leaf teaching materials

The loose leaf teaching material and the traditional teaching material are the same paper edition teaching material, the main difference in essence is "loose leaf". It can be split and re assembled at any time according to the learning needs of the students, updated and interspersed with new content, and expanded infinitely to adapt to today's rapidly developing society. Various new things are emerging, loose leaf teaching materials can be constantly updated and supplemented, and the teaching content can be adjusted to meet the social needs according to social development and changes. In terms of teaching content, it is constantly updated to meet the current rapidly changing knowledge needs, flexible variability. The biggest advantage of the loose leaf teaching material is that it does not need to reprint and bind the teaching material after updating the teaching material, which greatly reduces the paper demand and realizes the concept of green, low-carbon and environmental protection.

4. Exploration of loose leaf teaching material Reverse Engineering and Rapid Prototyping Technology

At present, there are many versions of traditional textbooks about reverse engineering and rapid prototyping technology in China, and some textbooks mainly have the following problems.[1] The teaching framework of textbooks is relatively simple. Some traditional textbooks use theoretical knowledge as the system component framework, and generally use the process operation command of point cloud data stage - polygon stage - surface stage in the teaching design. In teaching, the teacher first explains the teaching order one by one according to the framework content of the textbook design, and then uses the scanning data of typical models to carry out teaching, so as to promote the training of students' reverse engineering data processing ability. However, there is no data verification link in the traditional textbooks, nor does it reflect the importance of practicality in educating people, nor does it reflect the characteristics of professional operation skills, entrepreneurial teaching environment and professional teaching content. The content of the textbook is single and not updated enough. Some of the content makes students feel boring. It is difficult for students to establish a system for integrating knowledge, and it is not conducive to training students' practical skills. [2]The teaching materials do not reflect teaching students in accordance with their aptitude, and the difficulty design is unreasonable. In terms of difficulty and ease of design, the relevant textbooks do not follow the principle of gradual

progress, nor do they have corresponding online digital teaching resources. The difficulty level of the textbook content does not reflect the trend of gradual improvement. Therefore, in specific teaching applications, for students with different students and grades, teachers generally focus on experience, lack systematic teaching practice, and it is difficult to teach students in accordance with their aptitude and level by level, the overall teaching effect is not ideal. [3] The evaluation mechanism of teaching materials is not perfect. In traditional textbooks, the main content is curriculum knowledge and after-school connections, but the evaluation of curriculum teaching results is missing, which leads to the continuous reduction of students' participation. There is no assessment and verification link in the teaching process in the content of the textbook. It is difficult for teachers to realize the effectiveness of the course teaching, which is not conducive to teaching reform and optimization. However, in the current traditional textbooks, the infiltration of ideological and political elements is rare.

At present, reverse engineering and rapid prototyping technology is in a rapid development stage, and the updating of processes and technologies is changing with each passing day. Therefore, the exploration and design of the loose leaf teaching material of Reverse Engineering and Rapid Prototyping Technology need not only aim at the curriculum, but also serve the needs of the classroom, society and enterprises. It is necessary to make full use of "live" and "real" to achieve rapid content updating, close to practical production. The students are practical and easy to use.

5. Principles for compiling loose leaf teaching materials of Reverse Engineering and Rapid Prototyping Technology

In the process of training in-service teaching, science and engineering talents, the corresponding new technologies and processes have not been introduced, which is not cutting-edge enough to meet the needs of the transformation and upgrading of the manufacturing industry. Based on the application of advanced manufacturing technology reverse engineering and rapid prototyping technology, focusing on the reform of the mechanism and system, and taking collaborative education and technical innovation capability improvement as the breakthrough, we will give full play to the advantages of enterprises, research institutes and associations in relevant industries, and effectively gather innovative talents and high-quality resources from all parties. We should cultivate high-level technical talents, comprehensively build a new mode of collaborative innovation and development of industries related to reverse engineering and rapid prototyping technology application, and provide innovation drive and talent support for the development of related industries in China.

5.1. Diversified composition

Traditional textbooks are mostly compiled by full-time teachers in teams, so the content of textbooks is limited to the lack of practical experience. The work manual prepared by enterprises is aimed at on-the-job personnel, passing through theoretical knowledge. For vocational students, there is some lack of theoretical support in the process of learning the work manual of enterprises. Therefore, in the process of compiling loose leaf textbooks, it is necessary to integrate the advantages of both and learn from each other, Yes, the theory and practice can be seamlessly connected. Therefore, in the process of textbook compilation, it is necessary to break the convention, attract front-line technicians with practical production experience to the compilation team, and appropriately select some excellent students in post internship to participate. In this way, full-time teachers can avoid paying too much attention to theory and deviating from post requirements when compiling textbooks. In the process of compiling teaching materials, the theoretical knowledge of professional teachers+the current job needs of students in internship positions+the experience of front-line technicians in enterprises make the contents of loose leaf teaching materials change according to the changes of job needs, and the combination of theory and practice is more complete, further improving the diversification of teaching materials.

5.2. Modular and hierarchical teaching of textbook content structure

Modular and hierarchical teaching is a kind of teaching design that gradually strengthens practical ability according to the analysis of learning situation. It scientifically designs the content and connection of modules, innovates teaching methods, assessment methods and evaluation methods, highlights the combination and supplement of practice and theory, and firmly determines the goal and direction of ability training. In the design practice link, it is necessary to ensure the whole process of practice, uninterrupted, from shallow to deep.

The content of the textbook is modular and hierarchical teaching, which fully reflects the foresightedness, professionalism, practicality, and the introduction and teaching of new technologies, new equipment, and new processes. It always grasps the forefront of discipline development, pays attention to the connection with the examination of vocational qualification certificates (i.e., research and development of 1+X certificates), pays attention to maintaining horizontal contact with enterprises, understands the needs and changes of front-line posts, and improves the employability of updated students.

5.3. The content of teaching materials is integrated into information based teaching methods

We will use multimedia information technology to create a three-dimensional loose leaf teaching material, fully implement the National Vocational Education Reform Implementation Plan, closely combine the four in one talent training goal of "values+knowledge+skills+innovation", and explore and apply the loose leaf teaching material of Reverse Engineering and Rapid Prototyping Technology in accordance with the teaching materials in the "three education" reform task. In view of the characteristics of vocational education, one is to change the proportion of theory and practice in the content of teaching materials, strengthen the connection with production and life, highlight the integration of theory and practice, and pay attention to the renewal and change of learning methods by technological development. The second is to improve the form of textbooks, supplement the classical paper textbooks with loose leaf textbooks to new technologies and processes, and form a new form of integrated textbook system of "paper textbooks+loose leaf textbooks+multimedia platform" through supporting digital teaching resources; Third is to promote the complementary form of digital courses represented by online open courses and offline courses to meet the new demand of "Internet+Vocational Education".

6. Conclusion

This paper discusses the exploration and application of the loose leaf teaching material, and gives a concrete consideration to the loose leaf teaching material in combination with the course of reverse engineering and rapid prototyping technology. The loose leaf teaching materials and supporting teaching resources need to be constantly adjusted and updated according to the social needs and market changes, technology updates, and job needs. How to achieve the optimal design of "loose leaf" teaching materials is a subject that needs to continue to explore and research.

References

[1] Cao J, Zhang D, Zhou X, etc. Research on the development of the new loose leaf teaching material of Tourism English under the background of "Three Education Reform" [J]. Industry and Technology Forum 2022;21(14):167-168.
[2] Ma Q. The exploration and application of "loose leaf" teaching materials of big data comprehensive training courses in the "three education reform" - taking Chongqing Vocational College of Industry and Commerce as an example [J]. Scientific consultation 2022;(7):155-157.
[3] Jiang W. Research on the development of new loose leaf teaching materials under the background of "three education" reform—Take the course "Economic Law Basis" of higher vocational education as an example [J]. Industry and Technology Forum 2022;21(14):234-235.