International Journal of Education and Social Science; Vol. 9 No. 1; January 2022
ISSN 2410-5171 (Online), 2415-1246 (Print)
Published by Research Institute for Progression of Knowledge

The Practice of Scientific Research Feeds Teaching In EDA Technology and Application

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Abstract

The course "EDA Technology and Application" is the core course of electronic information engineering major in our University, which plays an important role in the training of talents in this major. Due to the insufficiency of frontier knowledge and moral education this paper puts forward the teaching reform research and practice of scientific research feeding teaching in curriculum. The school-enterprise cooperation projects was selected. Combined with the characteristics of the curriculum, the content of the project was decomposed, refined, optimized and improved. Then according to the idea of "preparation before class, learning in class, extension after class", constructed the teaching content. Firstly, the graduation design project was formed to teach and practice in a group of students, then the teaching cases were formed to practice in the class teaching, and finally the mature teaching cases are formed to promote. The paper also explored the ideological and political education elements contained in enterprise projects, and formed the ideological and political education system of "Five Spirits". The paper introduced the enterprise project management and evaluation mechanism, and constructed the multiple evaluation system, to evaluate the teaching effect.

Keywords: EDA technology, true cases, scientific research and feedback, curriculum ideological and political education, multiple evaluation

1. Introduction

EDA technology is based on programmable logic devices as the carrier, using hardware description language (HDL) to carry out circuit design. At present, FPGA (Field Programmable Gate Array) is the representative of Programmable logic devices. It has developed rapidly and been widely used since it came out in 1985.

According to the "2021 China Campus Recruitment Report" released by Wutongguo, FPGA engineers are among the best paid and favored by graduates. The position also has high requirements for technical level, which requires engineers to have extensive basic knowledge as well as a certain degree of practical experience[1].Therefore, this paper puts forward the teaching reform of "EDA technology and Application" in the way of scientific research feeding teaching, improve the quality of talent training, and cultivate talents in line with market demand.

2. Analysis of the current situation of the course

"EDA Technology and Application" is the core course of electronic information engineering major in our university, which plays an important role in the talent training of electronic information engineering major in higher vocational colleges. Before the teaching reform, the course was carried out by selecting some simple, typical examples to enable learners to master Verilog HDL language through imitation. learners can basically learn circuit design methods based on FPGA. Through the specific analysis of the current situation of the curriculum, there are the following three problems.

(1)Teaching and training projects of the curriculum mostly adopt simulation projects, lack of enterprise real projects

Before the teaching reform, the teaching cases of "EDA Technology and Application" course were mainly simulation projects, and there was a lack of teaching cases from real projects of enterprises. The course adopt the teaching mode of learning and doing, combining theory and practice. Most of the teaching projects were simulation projects and most of the teaching methods were task-driven teaching methods. This mode of teaching had achieved a certain effect, but students do not have a deep understanding of technology to serve the society, and the learning motivation was insufficient. So the learning enthusiasm was relatively low.

(2)The frontier knowledge of subject is generally discussed, but still Lack of learning carrier

In the field of engineering, new knowledge, new technology and new skills developed rapidly and int poses great challenges to teachers in teaching .Before the teaching reform , when introducing frontier knowledge of the course ,we only let students know the application of new technology in a certain field, but lacked the carrier and path for in-depth study.

(3) Ideological and political education elements of the curriculum and the teaching mode still need to be explored. The curriculum actively responds to the call of the state and carries out ideological and political education. However, the ideological and political elements of the curriculum are still not abundant, and the the teaching level of ideological and political of the curriculum is still in the exploratory stage, and has not yet formed a system.

3. The significance of scientific research feeds teaching in course

The basic task of higher vocational education is to train skilled professionals with high quality who adapt to production, construction, management and service[2].When scientific research feeds back to teaching, we should choose school-enterprise cooperation projects , and introduce the real projects of enterprises into teaching, which is of great significance to curriculum construction and talent cultivation.

(1) Scientific research feeds teaching, which is conducive to improve the quality and effect of teaching.

School-enterprise cooperation projects are oriented to market demand and apply cutting-edge technologies.Teachers use it as a teaching carrier to teach new knowledge and technology, which will be more vivid and specific. It provide an effective path for learning new knowledge and technology, so that cutting-edge knowledge and technology is no longer abstract, and is no longer just in books. Students can explore the application of new knowledge and new technology to social practical projects in the campus, enhancing students' practical ability and social sense of achievement. This can avoid the embarrassment of "do not know how to use", improve the quality of teaching and teaching effect.

(2) Scientific research feeds teaching, which is conducive to the consistency of talent cultivation and enterprise employment needs.

We carried out research on school-enterprise project cooperation projects and improved the projects, then combined with characteristics of Higher Vocational Students, designed suitable teaching cases for students. We applied them in the daily teaching, and optimized the curriculum standard construction. This can better meet the talents demand of enterprise , make the school talent cultivation in accordance with enterprise requirements.

(3) Scientific research regurgitates teaching, which is conducive to the ideological and political construction of curriculum.

School-enterprise cooperation projects are real projects from enterprises, which contain rich ideological and political elements of courses, such as rigorous craftsman spirit, labor spirit, social service spirit, scientific and technological innovation spirit, and teamwork spirit.It is more naturally and traceless to take ideological and political teaching with enterprise project as the carrier in classroom . It is more conducive to the ideological and political construction of curriculum, and the effect is better.

4. Scientific research feeds teaching practice

(1) Decompose the project of the enterprise and construct the teaching content according to the "three lessons" scenario.

FPGA has shown great advantages in real-time digital image processing and has been applied in many fields. Such as image processing systems in aerospace, medical image processing and analysis in biomedical field, portrait recognition in the field of security, checking the quality of the work piece on the production line, checking the defects of the printed circuit board, etc[3].

Therefore, combined with the characteristics of the course, this paper studies the real-time image processing part of the school-enterprise cooperation project "Centralized Automatic Control System for Bucket Turbine", and selects this part as the original content of the course teaching. Then decompose, refine and improve the original content to make the content moderately in difficulty and fit the teaching objectives. According to the idea of "preparation before class, learining in class, extension after class", construct the teaching content. As shown in Fig. 1, in order to let students know about the whole project, the introduction of the whole system and other subsystems will be made into video materials and put online for students to "preparation before class", online learning and group discussion. The image processing content of the project is optimized and improved in accordance with the learning situation, and the difficulty is appropriately reduced. The content is selected as " learning in class", which is led by teachers and leads students to concentrate on classroom learning. Then combining with the real scenarios of enterprise projects, improve the task indicators, make it be an extension task of "extension after class". The necessary supporting materials are provided to students through online courses. Students can complete the task together by teamwork.

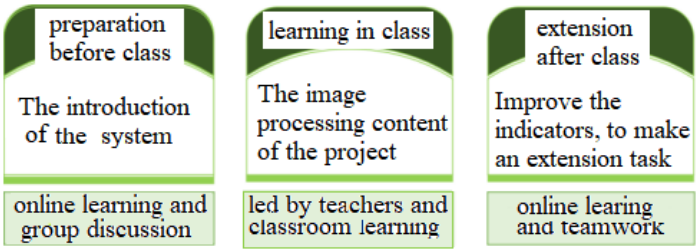

Fig. 1 Construction of teaching content in "Three Lessons" scenario

Introduce the project development process of enterprise and develop teaching cases

To ensure the smooth working of this subject and achieve expected goal, avoid the embarrassment of "ideal is very plentiful, reality is bone", we introduce the new product development process in enterprise : prototyping--small batch production--to market --market feedback correction -- scale production. We use the development process to devolope the teaching cases .The specific implementation is shown in Fig. 2.

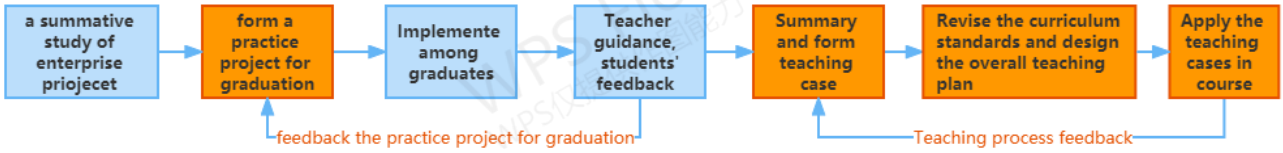

Fig. 2 The teaching case development process

Firstly, a summative study is carried out on the automatic control system of the bucket turbine, focusing on the part of real-time image processing and then decomposed, analyzed and transformed into a comprehensive practice project for graduation.

Then, 3-4 students will be selected to form a project group and stay in school to focus on project learning and research. Teachers will arrange at least 8 class hours per week to track and guide the whole process, and dynamically modify the project according to the feedback of the project group, so as to make the comprehensive practice project more suitable for the learning situation.

Further design, form the teaching case which is suitable for classroom concentration teaching. Revise the curriculum standards and design the overall teaching plan.

The improved teaching cases are applied to the class of "EDA technology and Application". The students' feedback is emphasized in the teaching process, and the teaching cases are further improved through timely reflection and rectification.

Excavate the ideological and political elements of enterprise projects and improve the ideological and political education system of curriculum

In the teaching practice, we explored the ideological and political elements contained in enterprise projects ,and formed ” five spirit” education systems of rigorous craftsman spirit, labor spirit, social service spirit, scientific and technological innovation spirit and team cooperation spirit to improve the ideological and political education system . According to the phases of project reserch, project development, project application ,as shown in fig.3,naturally blend in the " five spirits" ideological elements in teaching. According to the project development process, design reasonable teaching links, and make students grasp ideological instruction in "listening" and "doing".

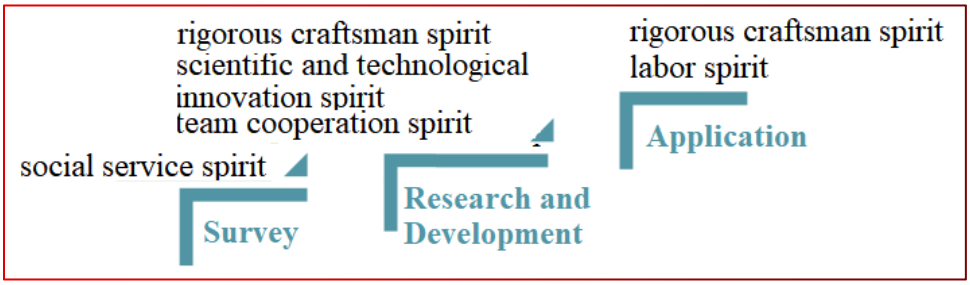

Fig. 3 "Five Spirits" ideological and political education system

Introduce enterprise project management and evaluation mechanism, construct multivariate evaluation system.

The course employs technical engineers from enterprises as part-time teachers. On the basis of the original evaluation system, the enterprise project management and evaluation mechanism are introduced to construct a Multivariate curriculum evaluation system,as show in Fig. 4.Give full play to motivating and guiding role of evaluation, improve the teaching effect, make the evaluation promote the motivation of students to learn and improve the effect of teaching implementation, an further promote the teaching reform.

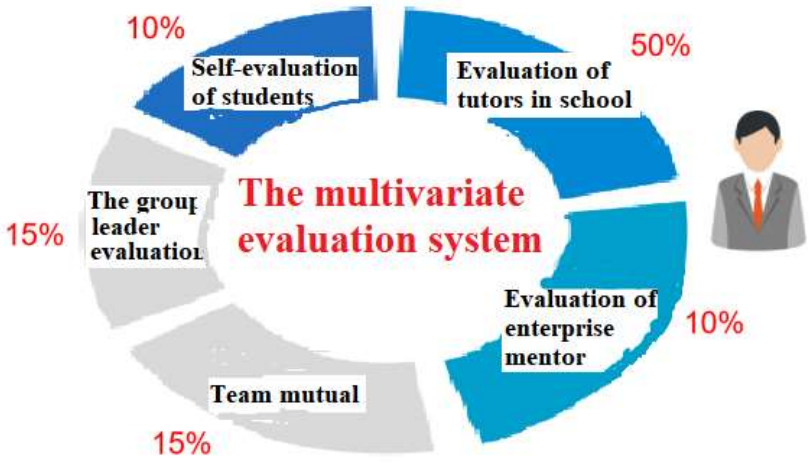

Fig. 4 The multivariate evaluation system

4. Conclusion

Through the teaching practice in the electronic information engineering college students of grade 19 and electronic information engineering undergraduate students of grade 20, it is proved that scientific research feeds teaching improves the teaching effect of the course. It obviously improves the driving force and interest of students. The students' sense of achievement in learning becomes stronger, and the sense of gain is improved.

Acknowledgements

Education Department of Zhejiang Province Foundation (FG2020056).
Wenzhou Polytechnic (WZYYFFP2021010).
Wenzhou Polytechnic (WZYzd202101).

References

[1] Jingyun.Zhou.Hot Job market, Journal of Success and employment,vol.12(2021) 20-21.

[2] Jiansong.Zhou. Connotation and Development Path of Higher Vocational Education with Chinese Characteristics in the New Era, Journal of China Higher Education Research,vol.4(2019)98-102, 108.

[3] Dongkai. Li: *Research on image processing algorithm based on Morphology and logarithm theory and FPGA implementation*(Xidian university, China 2020), p.1.