

Construction and Implementation of Practical Teaching Model of Electronic and Information Engineering Major based on CDIO

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Abstract. With the continuous development of science and technology, the social demand for technical talents is increasing. Under the guidance of talent training plan, colleges and universities set up the teaching of electronic and information engineering major. Based on CDIO engineering education model, the practical teaching of electronic and information engineering major is carried out in order to improve the comprehensive quality of college students, such as practical ability, engineering application ability, innovation ability, scientific research ability and so on. Combined with many years of working experience, the author probes into the problems existing in the practical teaching of electronic and information engineering major in colleges and universities, analyzes the characteristics of electronic and information engineering major, and finally put forward the practical teaching reform of electronic and information engineering major under CDIO model.

Introduction

CDIO is the latest achievement of international engineering education reform, which is an engineering education concept founded in four years of research by four universities, including Massachusetts Institute of Technology and Royal Swedish Institute of Technology, and pays attention to the application of conception, design, implementation and operation in the project cycle. Under the background of economic globalization, more than 50 colleges and universities in China have used CDIO teaching model to carry out the teaching of electronic and information engineering major, and have achieved certain teaching results. At present, in order to improve the quality of practical teaching of electronic and information engineering major and improve the comprehensive quality of students, colleges and universities should innovate the practical teaching model with the idea of CDIO education in order to improve the practical ability, innovative consciousness, scientific research ability and comprehensive quality of students, and train the professional technical and high quality talents of social needs.

Problems existing in practice teaching of electronic and information engineering major in colleges and universities

Under the guidance of the talent training plan, colleges and universities in our country have increased their investment in the practical teaching of electronic and information engineering, the relevant hardware and software teaching facilities have been constantly improved, and the relevant experience in running schools has also been increasing. But at the same time, it also makes the teaching problems of information engineering specialty in colleges and universities stand out, such as the current electronic information engineering education is divorced from the development needs of the times and so on[1].

lacking the characteristics in the model of running a school. In the Program for the Reform and Development of Education in China, it is clearly pointed out that "higher education should distinguish different regions, subjects and schools, set development goals and priorities, and formulate classification standards and corresponding policy measures for colleges and universities, so that various types of schools have a reasonable division of labor and have their own characteristics at their respective levels. The regional specialized education should be vigorously strengthened and developed". It is necessary for colleges and universities to set up a unique mode of

running schools according to their own development characteristics and the mode of running colleges and universities in the region, etc., which requires colleges and universities to carry out education and teaching in accordance with their own development characteristics and the mode of running colleges and universities in the region. However, at present, 15 colleges in the provinces and cities where the author is located have opened the major of electronic and information engineering, and at the same time, the teaching model, teaching idea, teaching objective and teaching system all have some similarity, and lack the characteristic characteristics of the running the school mode, to a certain extent, the innovation and development of the electronic information engineering in colleges and universities are restricted to a certain extent.

Lacking the rationality in curriculum system. To a certain extent, the content system of practical courses determines the quality of talent training. Most colleges and universities design the practical courses of electronic and information engineering major according to the patterns of curriculum experiment, computer training, curriculum design, professional practice and graduation design. However, after determining the content system of practical curriculum, some colleges and universities ignore the adjustment and innovation of the system, and most of the curriculum system is used for more than three years, which makes the content of practical curriculum in colleges and universities unable to meet the development needs of the times and lack of flexibility and application[2]. To a certain extent, it reduces the time and opportunity for students to participate in practical activities, and restricts the improvement of practical ability of students. At the same time, the content system of practical courses in some schools is lack of rationality, such as the number of practical courses only accounts for about 15% of the total class hours, the number of practical courses is less, and there are many types of practical courses, and the connection of courses is chaotic, which increases the difficulty of practical learning of students. In addition, most of the practical courses of electronic and information engineering in colleges and universities are mainly verification experiments, which can not improve thinking ability and innovation ability of students.

Lacking the innovation in teaching model. Compared with other majors, the course of electronic and information engineering major is more practical and engineering. Most of them teach basic theory knowledge and learning methods through experiments or practical exercises, and cultivate scientific research ability, innovative consciousness and other comprehensive qualities of students. However, in the practical teaching of electronic and information engineering specialty in colleges and universities in our country, most of its teaching mode is mainly verification experiment, and the comprehensive design experiment and unit design experiment are relatively few, which restricts the improvement of independent innovation ability of students to a certain extent. At the same time, the practical content is divorced from the practical application, so that students can not meet the development needs of society and restrict the development of students.

Lacking the scientific evaluation system. As a major with strong practicality and application, the evaluation of electronic and information engineering major carries on the summary evaluation according to the attendance, practical ability and practice report of students, neglect the understanding and analysis of the experimental circuit function of students, lack practical process evaluation, and restricts the improvement of practical skills of students to a certain extent.

Analysis on the characteristics of electronic and information engineering major

The electronic and information engineering major is a specialty which integrates modern electronic technology, information technology and communication technology, which mainly realizes electronic information control and information processing through computer and other modern technologies, and its main research contents include the acquisition and processing of information, the design, development, application and integration of electronic equipment and information system. At present, in order to train high-quality and specialized technical talents, colleges and universities should expand their professional caliber in accordance with the requirements of the Program for the Reform and Development of Education in China, and combine with the application type in accordance with the professional norms formulated by the education department, and so on. The training needs of research-oriented and compound talents should be formulated, and the

teaching reform should be promoted with the cultivation of innovative talents as the core, so as to meet the needs of enterprises for scientific research talents and technical application talents. At the same time, colleges and universities should comprehensively consider the development goals of students, the needs of the science and technology market, and comprehensively plan the teaching contents of individualized courses such as class hours, credit plans, school hours, experimental items, etc., in order to optimize the curriculum system and cultivate the technical talents needed for social development[3].

In view of the continuous upgrading of market demand and technological development, professional teachers should adjust the curriculum content system in time, increase the teaching content, cancel the designated curriculum, and according to the needs of development of students and market, etc., such as setting up senior seminar courses, adding new information processing technology, new communication technology and other teaching courses to promote the personalized development of students and ensure their high employment rate. In addition, according to the "National Electronic Design Competition for College students", colleges and universities also cultivate the ability of circuit design, manufacture and debugging of students, and combine the results of experimental teaching and scientific research to build The course system of electronic information engineering of high foundation and multi-level, which integrates scientific research and comprehensiveness..

Practice teaching reform of electronic and information engineering major under CDIO Model

Clear positioning of training objectives. At the present stage, in order to carry out the practical teaching of the electronic and information engineering in the CDIO model, it is necessary for colleges and universities to combine its own school-running thought, the subject background of the electronic and information engineering, the professional positioning of the industry, the market demand of high-quality talents and the professional characteristics of cultivating the technical talents, colleges and universities should fully study the teaching experience of the electronic and information engineering major at home and abroad, and make a clear position of the training target of the major in accordance with the current situation of the development of our specialty. At present, the training goal of electronic and information engineering major in colleges and universities is to devote itself to engineering application. According to the policy of regional economic construction, the electronic and information engineering major should train talents with solid knowledge of engineering science and technology and cultural literacy of humanities and social sciences to meet the needs of the development of regional engineering technology. At the same time, students should have certain basic theory knowledge of electronic and information engineering, have strong ability to solve engineering technical problems, and master the development trend of the market in an all-round way to solve the problems encountered in the work through appropriate theoretical and practical skills[4].

Constructing practice curriculum system. As the main way for colleges and universities to carry out the practice teaching of electronic and information engineering major in CDIO, colleges and universities should pay attention to the collection of knowledge with the project as the core in the teaching of electronic and information engineering. The construction of practice curriculum system, which integrates technology and ability training, attaches importance to the cultivation of the professional ability of students in carrying out experimental teaching, and improves the design ability of students through innovative and scientific training. At present, some colleges and universities construct the practice curriculum system through the project classification according to the present situation of professional teaching. In this process, the first-level project is the preliminary guiding stage of the practice curriculum system. At this stage, Professional teachers design basic experiments and basic unit experiments according to public basic courses and professional basic courses in order to cultivate the basic abilities of students, such as practical ability, engineering consciousness and engineering analysis ability. The second-level project refers to the teachers setting up professional experiments and basic comprehensive experiments and other practical training courses in combination with the basic professional theory and technology, in order

to cultivate core competence of students, such as the analysis, design and application ability of basic professional technology and engineering, and team work spirit, etc. The third level project refers to the graduation thesis of professional comprehensive practice under the guidance of professional theory, knowledge and technology, and trains innovative ability and comprehensive application ability of students through comprehensive application training in order to promote the all-round development of students.

Innovating the practice teaching content. With the continuous development of information technology, the relevant theoretical knowledge and market demand of electronic and information engineering major are constantly updated. At present, the teaching of electronic and information engineering major in colleges and universities should meet the needs of market development. It is necessary to inherit its development achievements, devote itself to meeting the needs of the market, draw lessons from the advanced teaching ideas and technologies in the teaching of electronic and information engineering major at home and abroad, integrate practical teaching with engineering innovation achievements, and innovate the contents of practical teaching. According to the national talent training plan for colleges and universities, the theoretical teaching and practice teaching will be integrated to train high-quality and professional innovative and technical talents[5].

On the basis of comprehensively analyzing the talent training mode and engineering market demand of colleges and universities at home and abroad, the author combs the current practice teaching contents of our university, and constructs a practice teaching scheme with engineering design as the core according to the concept of CDIO education. Its teaching program has the following characteristics:

Pay attention to the cultivation of the basic experimental skills of students, and emphasize the improvement of data analysis ability of students to cultivate their experimental skills.

Formulate the undergraduate tutor system, that is, to invite professors with high professional literacy to set up an undergraduate tutor group, each professor is responsible for 10 undergraduates, through the professional guidance of professors to the students, to enhance their understanding of electronic information engineering knowledge and practical skills, and broaden its knowledge, improve its professional moral literacy, ideological and moral cultivation and so on.

In order to avoid the repetition of relevant courses and promote teachers to carry out practice teaching through the organic contact of relevant knowledge, the experimental curriculum group is combined with the core experimental courses of the major. And guide students to further understand professional knowledge on the basis of associative multiple factors, and flexibly use professional skills, and finally improve the practical ability and autonomous learning ability of students. For example, the core experimental courses include information acquisition and information transmission, digital system, analog circuit system, signal and signal processing, electromagnetic field and electromagnetic wave, etc., in teaching, according to the present situation of electronic and information engineering teaching and the needs of development of students, teachers integrate experimental courses, such as analysis and analog electronic circuits, C language and data structure, to construct integrated experimental courses and strengthen understanding of students of relevant knowledge through strengthening the relationship between knowledge points.

Establishing practice evaluation system. The main goal of CDIO teaching model is to train innovative technical talents to meet the needs of market development. As a practical and applied specialty, electronic and information engineering major pays attention to the improvement of the practical ability of students in teaching. Therefore, When constructing the evaluation system of practical effect, professional teachers should evaluate the practice process and practical effect of students in a diversified way. For example, on the basis of the current performance evaluation, teachers evaluate their practical process according to the project report of students, design evaluation, design mid-term inspection and so on. In order to improve the practical ability and innovative consciousness of students, a policy of exemption from examination is formulated for students who have been rewarded or published papers in large-scale competitions, and students are guided to carry out the comprehensive evaluation through self-evaluation, his evaluation and experimental report.

Conclusion

In summary, the practice teaching model of electronic and information engineering major based on CDIO plays an important role in improving the comprehensive quality of students. In teaching, teachers should clearly define the training objectives, construct the practice curriculum system and innovate the practice teaching content to establish a practice evaluation system to improve the practical ability and innovative consciousness of students, and to provide innovative technical talents for the society.

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