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## Electronic Information Major Practice Teaching Reform Concentrated Research and Innovation

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### Abstract

Bringing forward the concentration of practical teaching system reform ideas are based on product-oriented, hierarchical progressive. The idea associates all parts of practice, establishing a large framework system. This approach reflects the intrinsic link between knowledge, reached through the practice of teaching will be the focus of a comprehensive knowledge of the purpose. Its implementation will help to change the traditional teaching mode, and to further promote the theory of teaching, thereby raising the overall quality of training.

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*Keywords:* practice teaching; product-oriented; hierarchical progression

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### 1. Introduction

Practice teaching, in particular, focus on practice teaching application-oriented training is a very important way to improve students' basic skills, professional competence, proficiency and engineering quality. Professional training of Electronic information major is determined by different types of training objectives in different schools. Therefore, there are differences in both content and timing of practice teaching arrangements. It usually include: electronic technology training, curriculum design, electronics, micro-controller system, curriculum design, professional curriculum design, production practice, graduation design and other sectors. It is usually within 30 hours of teaching weeks (accounting for about 20% of the time teaching programs).

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Focus on practice teaching for improving the quality of personnel training plays an important role. However, the concentration of the traditional practice of the teaching process for the most part independent of each curriculum, its content is limited to specific curriculum content, so that all aspects are independent. It can not reflect the intrinsic link between knowledge or can not achieve the goal that concentration teaching becomes an important way of knowledge synthesis.

During the "Eleventh Five-Year" period, in order to further improve the quality of teaching practice, we have proposed concentrated practical teaching system reform ideas that are based on product-oriented, hierarchical progressive to open up all aspects of practice and establish the practical framework system. And as an opportunity for reform: by the reform of education system to promote the practice of teaching and learning shift to practical teaching system reform to enhance students' creativity and engineering ability to practice teaching system reform to promote innovation and personnel training evaluation system of the building in order to bring practical teaching system reform to improve the quality of teaching theory, therefore improving the overall quality of the training hospital, etc.

## 2. The composition of electronic information major's practice teaching system

The practice teaching system of our school's electronic information major mainly consists of curricular and extra-curricular practice teaching. And the extra-curricular practice teaching mainly composed of three level of extra-curricular teaching system—professional, college, school, and they are responsible for the opening of laboratory, student studios, innovation centers, internal and external school competitions. The curricular practice teaching is shown in Figure 1, mainly by the curricular experiment, concentrated practice teaching part.

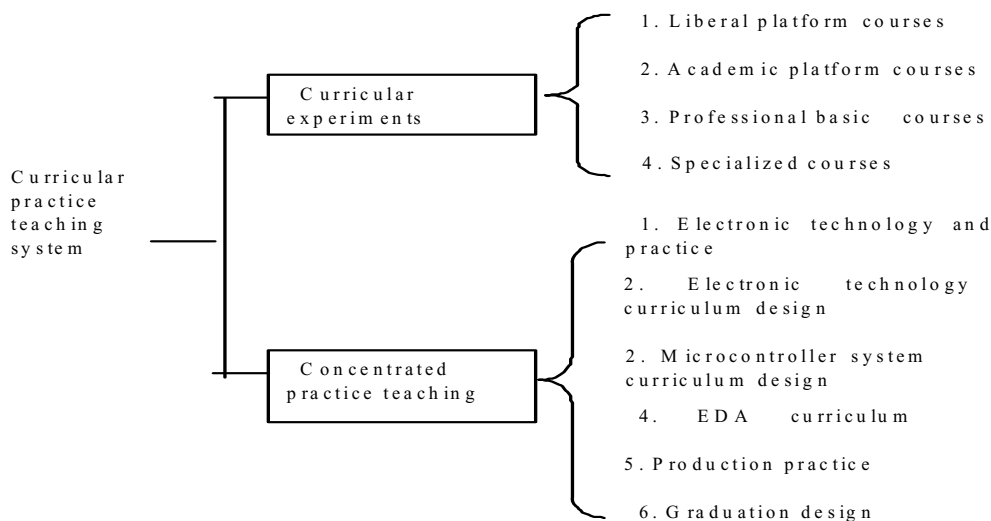


Figure 1 Curricular practice teaching system

Curricular experiments include four levels of content: Liberal platform courses, academic platform courses, professional basic courses and specialized courses.

Among which the concentrated practice teaching includes six links with the aggregation of 30 teaching weeks, and occupy 20% of the total hours or more in the training program, so concentrated practice teaching plays an important role in improving the quality of personnel training.

### **3. The fundamental and main purpose of electronic information major's practice teaching system**

Concentrated practice teaching is the established important teaching link based on professional training objectives in the professional training program. It is the concentration, specific and comprehensive training based on specific curriculum requirements, which aims to strengthen and improve the ability to use the knowledge to analyze and solve problems. The implementation forms usually include a variety of ways such as research, practice and design. According to the different types of training objectives, the arrangement of concentrated practice teaching part from different schools' electronic information major are different in content and time ,which usually include practice of electronic technology, electronic technology, curriculum design, curriculum design, micro-controller system, professional curriculum design, production practice, graduation design and other sectors.

Electronic technology curriculum design: to train students the ability to use analog electronics, digital electronics knowledge to design, manufacture, debug specific functional circuit and solve the problem in electronic circuit design. The aim is to encourage students to master electronic manufacture experience, consolidate the foundation and develop skills.

Microcontroller system curriculum design : a micro-controller classroom and extension of laboratory teaching, it takes effect in consolidating the knowledge, strengthen the overall capability , improve the ability in software and hardware design debugging and inspire innovative thinking .This course is designed to train students the integrated design ability about the micro-controller , consolidate and deepen the understanding of principles of micro-controller, improve the ability of synthesizing curricular knowledge and the corresponding self-learning ability, and gradually set up the system concept and overall design ideas of developing computer application system.

EDA curriculum design: EDA is an extension of classroom and laboratory teaching, which aims to utilize the modern electronic design (EDA).It enables students to master the design principles, design process, means and hardware debugging ways of the electronic design automation by means of electronic design automation systems ,in the mean while, allow students to truly understand the forefront of modern electronic technology and design methods, thereby improving the students to use single-chip, EDA design tools and other advanced design instruments to solve problems and the ability of synthesizing professional knowledge to solve practical problems.

Production practice: touch the production, research, and business management practice, its main purpose: to enable students to understand the organization ,management, process and technology approach of modern industrial production in the scope of the professional business , training students a variety of basic knowledge and practical ability in electronics and information technology-related job .To improve the application of knowledge and skills can lay a good foundation for the student's career .

Graduation design: Graduation design is an important teaching process after the student completing the whole course of study and varieties of important practical links. Its mission is to further develop and improve the comprehensive use of the knowledge, analysis and the ability to solve the practical problems in the application of electronic technology and information processing sector .Learned to further deepen and expand the basic knowledge, professional knowledge, to improve the experimental ability; improve learning capability and ability to work independently. Enable students to basic training with the help of the engineers, to develop their ability to carry out the preliminary research work.

### **4. The implementation methods of product-oriented, hierarchical progressive concentrated practice teaching reform**

Concentrated practice teaching reform aimed at enhancing the level, progressive, linkages and integrity of practice teaching, helping the students develop the necessary skills and abilities in stages.

So we propose product-oriented, hierarchical progressive the concentrated practice teaching reform ideas which is prototype-oriented and unite varieties of concentrated practice teaching links to the development process of a complete product. To achieve this purpose, firstly, you need to develop multiple prototypes that cover the main areas of the profession, and decompose them into different modules.

At the beginning of the students' enrolling, we select the appropriate products that are based on hobbies and interests as the target and objective in the future's study , and complete different modules in the future's practice links . When all the practical links are completed, the product is developed in success .This will correspond different practice areas with each module of a product, making the entire professional theory and practice teaching correspond the development of a complete prototype. The promotion will help to change the traditional teaching model.

Here, we regard the "voice coding system" as an example to illustrate its implementation methods and the main steps:

The basic function of speech coding system is making digitalized acquisition, processing, coding with the input voice signal. So the system is made of the voice signal amplification and acquisition module, 51MCU module, DSP module 54 series, FPGA logic control module and power module. Among which, 51MCU modules including keyboard that display and is responsible for the control of signal acquisition and the functions of DSP BOOTLOADER, DSP module is responsible for the implementation of various coding algorithms, FPGA module is responsible for the realization of logic functions, while power supply module is in charge of providing varieties of power supply used by systems 1.8V, 3.3V, 5V and so on.

The corresponding relationship between each module and the different practice areas are as follows:

- Electronic technology practice: motherboard and power supply module
- Electronic Technology Course Design: voice signal amplification and acquisition module
- Microcontroller curriculum design: micro-controller module + keyboard + display module
- EDA curriculum design modules: FPGA module

Production practice and graduation design: the completion of various coding algorithms to build complete systems. Each module and corresponding relationship between different courses are shown in Figure 2

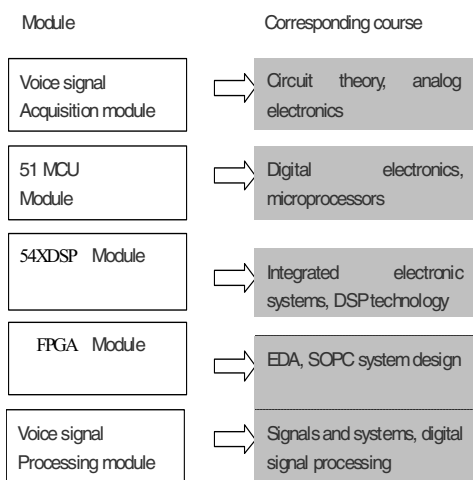


Figure 2 Speech coding system and the corresponding course modules

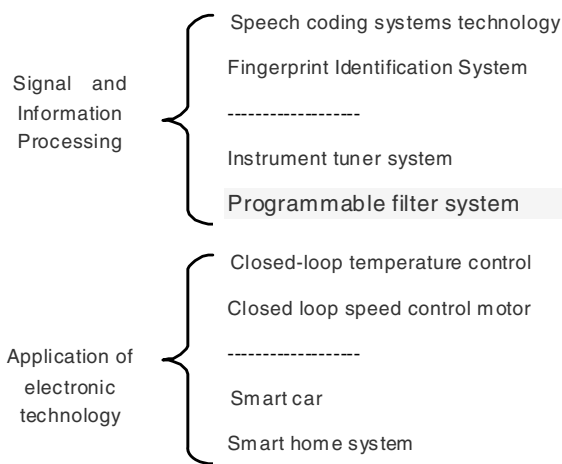


Figure 3 prototype example

In order to enable students to complete the system in the learning process, teachers must complete the system design first. So 10-20 pre-designed prototypes or more that cover all the professional direction of the main areas are needed, the selection of prototype products needs in moderate difficulty, the division of the module has hierarchy. Figure 3 is the prototypes system example that the signal and information processing, application of electronic technology major have chosen.

## 5 Take centralized teaching practice reform to promote professional development

*5.1 Take the centralized teaching practice for an opportunity to actively explore self-learning, target-based objectives, research-based learning teaching model.*

At the beginning of the Students' enrolling, we select the appropriate products that are based on hobbies and interests as the target and objective in the future's study , and complete different modules in the future's practice links . When all the practical links are completed, the product is developed in success .This will correspond different practice areas with each module of a product, making the entire professional theory and practice teaching correspond the development of a complete prototype. The model that is based on product-driven helps the use and promotion of teaching model such as self-study, research-based learning models such as and so on.

*5.2 Take the concentrated practice teaching reform to drive improvement in the quality of teaching theory, thus improve the overall quality of the personnel training.*

"Learning by doing" concentrated practice teaching framework system that is "Product-oriented, hierarchical progressive" is established, it corresponds different practice areas with each module of a product, corresponds theory courses with the corresponding modules and theory , corresponds the development of a complete prototype with the profession theory and practice teaching links. And it can improve the targeted and focused of the practical curriculum study, driving the improvement of theory teaching's quality by the practice teaching reform.

*5.3 Take the practical teaching system reform for an opportunity to further enhance the professional capacity of teachers.*

The quality and level of teachers plays a decisive role in the teaching effect. Engineering teachers, not only require a solid theoretical knowledge, having some engineering experience is particularly important. Otherwise, it is difficult to understand the true nature of engineering work, the specific of engineering problem can not be prominent in the teaching, not conducive to develop students' engineering capabilities. The cultivation of teachers' engineering abilities helps to integrate theory with practice, shortening the distance between students and the actual needs of enterprises.

*5.4 Take the practice teaching system reform for an opportunity to explore innovative personnel training and evaluation system based on "learning by doing"*

Whether students truly master a variety of complex knowledge and skills, or have the ability to reach a level, which for engineering students, are very important. The traditional method used to assess students' learning --- teaching test, is by means of a reasonable way with test function. Thus the traditional learning evaluation methods should combine exploration of non-traditional learning evaluation, including the use of student self-evaluation, peer evaluation, oral tests, study record, displaying works, papers and so on.

## 6. Conclusions

Practice of teaching, especially concentrated teaching practice links are in a pivotal position in human resources training especially in application-oriented training, however, the traditional concentrated teaching practice sections are in lack of continuity. "Eleventh Five-Year" period, the product-oriented,

hierarchical progressive concentrated teaching practice reform we have proposed played a good role in promoting the quality of teaching and improving the quality in personnel training.

### **References**

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### **Appendices**

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