

Exploration and Practice for Cultivating the New Professionals of Electronic Information in OBE Mode

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Abstract

This article relies on Jiangsu province characteristic major construction project named electronic information science and technology. The project focuses on cultivating the ability of electronic information science and technology professionals. It is under the way of enhancing the "Multidimensional ability" of students. "Multidimensional ability" includes innovation ability, practical ability, social adaptability, team cooperation ability, international view, etc. Jiangsu University aims at cultivating applied professionals of electronic information who can quickly adapt to society and career, which is called out come best. Then it carried out a series of teaching reform and exploration. The school enrolls students by different majors and cultivates students by dividing into different period. The mode breaks the boundaries of traditional majors. Jiangsu University implements "basic platform + professional module" theory teaching system. It optimizes the current theoretical curriculum teaching system and adapts to the trend of personalized education. The school implements a talent-training and practical ability-training teaching system. It constructs the practical teaching system of "multi level and multi category". The school forms a model of training program supplemented by practical ability to develop supplementary programs. It solves the problem of the combination of theory curriculum and practical curriculum. It also ensures the multi-dimensional ability of students to get synchronous improvement. By three years of teaching reform, students' overall quality, multi-dimensional ability, social acceptance and so on have a clear upward trend.

Keywords: electronic information; quick adaptation; multidimensional ability; professionals

1. Introduction

The electronic information is the traditional major in science and engineering colleges and universities^[1-3]. With further development of China's modernization, electronic technology is playing an important role in various fields. In 21st century, the information age, the rapid development of information technology has set many new technology and emerging industries in motion^[4]. It has also created a new economic and social demand. It also provides new opportunities and broad space for the development of electronic information. To adapt to the rapid development of the electronics and accelerate the introduction of technology digestion, absorption and self-development, Jiangsu university must cultivate advanced professionals with the knowledge of electronic information technology^[5]. How to cultivate professionals both owning a solid theoretical foundation and good practical ability to adapt to the rapid development of China's science and economy^[6]? That has been a problem the university educators unremittingly explored. There are still many problems to be studied and solved in the process. How to cultivate comprehensive ability of students of electronic information engineering in applied undergraduate colleges^[7]? How to construct appropriate teaching system? How to implement the reform of the teaching system^[8]? How can cultivate "multi-dimensional ability" to further strengthen the ability of students? How to deepen the reform of curriculum system and teaching content to adapt to the new development of electronic information technology? A complete teaching system would be formed through various research and practice.

2 Personnel training objectives

2.1 Applied talents

Applied talents means specialized talents who master comprehensive techniques, including theory and experience. They can effectively apply professional knowledge and skills. Applied talents are most widely needed by society and divided into many types. It is different from research - typed talent. For example, applied talents own outstanding innovation ability, pioneering ability, knowledge application ability and practical ability. It is required to have a strong language expression ability, cooperation ability and lifelong learning ability. The 21st century is the era of knowledge economy. Facing the fierce competition in the talent market, the cultivation of innovation ability has become an urgent task of higher education to meet the needs of the market.

2.2 Cultivation of multidimensional ability

The cultivation of multidimensional ability is to train innovation ability, practical ability, social adaptation ability, team cooperation ability, international view, etc. As shown in Figure 1, it is a comprehensive evaluation of ability of the students. The school takes students extracurricular science and technology activities and teacher research as the basis to cultivate innovative spirit, innovation ability and teamwork ability. The school carried out social practice with high effectiveness. Students are called on to be widely involved in the teacher research, production practice, school enterprise cooperation and training of outstanding engineers. In this way, practical ability and social adaptability will be improved. Through international exchanges and cooperation, the school introduces advanced teaching ideas and system for the same major. Students can participate in teacher's international cooperation projects and other measures to cultivate students' international vision. As result, students can improve their ability while at school on the basis of having solid professional knowledge, reasonable knowledge structure and excellent ideological quality.

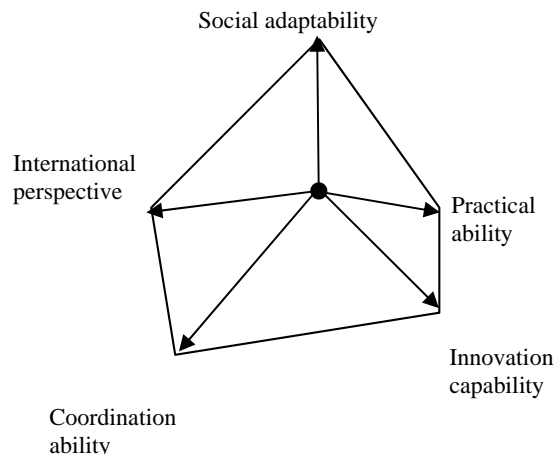


Fig. 1. a comprehensive evaluation of the students' ability

2.3 "Quick adaptation to society and career" applied professional

"Quick adaptation to society and career" is a new talent training mode. The mode takes social demand as the guidance to meet the diverse demand of the electronic information industry. Connection to society completely is as soon as possible to adapt to the career. They can use the shortest time to adapt to the various positions in the industry. Fit to work after graduation is to play an important role in their respective positions. They can provide valuable contributions to enterprises and units in the shortest time. Under the mode, these professionals are equipped with widely knowledge, an international perspective, ability of mastering the common engineering design platform and software. They also have much practical experience, basic concept and methods that can be used in engineering design, higher engineering quality, teamwork spirit and international perspective.

3 Talent training mode reform of enrolling students by different majors and cultivating students by dividing into different periods

From Jiangsu University beginning a comprehensive credit system, the school developed a credit system of student status management system. The school implemented the flexible educational system and elective system, tutorial-choosing system. It improved the efficiency of the comprehensive teaching management information system and established a sound teaching quality monitoring system and long-term mechanism of teaching quality assurance. It implemented student apartment management

system coordinated with the credit system teaching management. The electronic information of department of electrical information engineering, beginning from the autumn of 2012, department of electronic information includes two majors. The two majors include electronic information engineering and electronic information science and technology. It focuses on how to enhance the students' multidimensional ability. It implements the training mode of enrolling students by different majors and cultivating students by dividing into different periods, multi-level and multi-class practical teaching system, "basic platform + professional module" teaching system, multi-level and diversified school enterprise cooperation training and a series of reform and exploration. To ensure the success of the teaching, a complete teaching reform and exploration of the quality tracking system includes "construction planning, system guarantee, process monitoring, evaluation, feedback". The effect of tracking system was built. As shown in Figure 2.

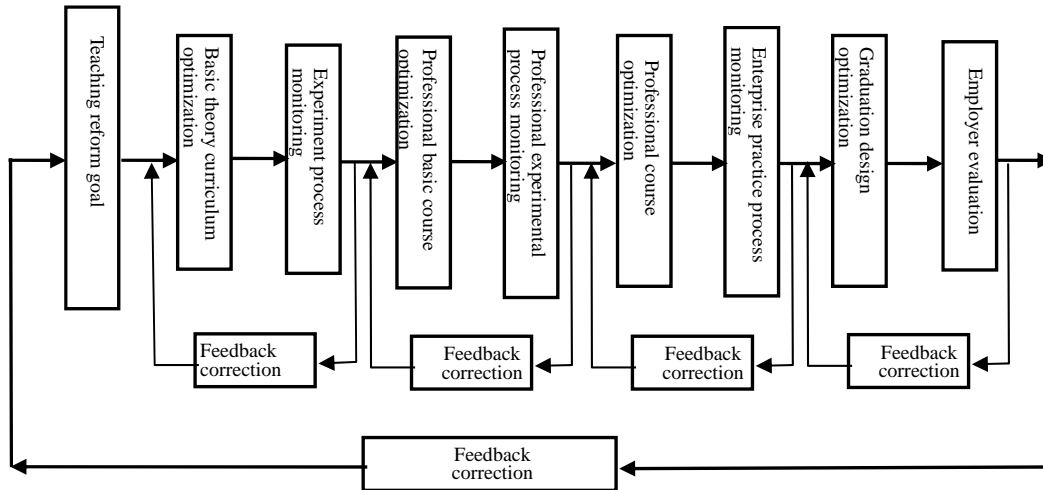


Fig. 2. The teaching reform and the quality of exploration, the effect of the double closed loop tracking system

3.1 Ideas and design of reform for cultivating students by dividing into different periods

The training mode is enrolling students by different majors and cultivating students by dividing into different periods. The mode lies in breaking the limitation of major to meet common demand. The first two years, large scale training model is carried out. Then in third year one year of specialty cultivation will be implemented. The cultivation is based on students' wishes to enable students to form specialty in a technical field. It implements specialized education, and reflects the personality demand. Last year, according to social demand and employment, diversion training for one year makes the combination of personnel training and industry demand. The relations of curriculum design and ability cultivation as shown in Figure 3.

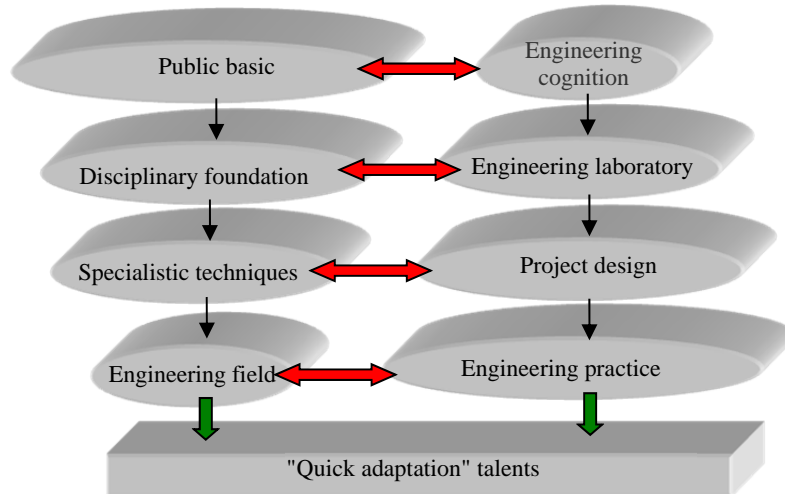


Fig. 3. the reform of the applied talents in the section

The project explores reform pilot by cultivating students by dividing into different periods. It takes "engineering cognition - engineering experiment - engineering design - engineering implement" progressive ability training. The project takes the theoretical teaching system of "basic platform + professional module" and practical teaching system of "multi-level, multi-class" as the basis. To fit the reform of cultivating students by dividing into different periods, the group carried out diversified and multi-level cooperation. It aims at strengthening teachers' engineering background and enterprise practice. It formulates the reasonable mechanism of training personnel management. It implements several comprehensive examination mode and so on. As a result, preliminary exploration of new system for electronic information applied talents is constructed. The talents are equipped with generalist and specialist, commonness and individuality, personal development and industry needs. At last, the school would realize the overall goal of professionals with the concept of "wide caliber ,massive engineering".

3.2 Exploration and practice for the optimization of highly integrated curriculum system of basic platform and professional module

The theoretical teaching system of basic platform and professional module is to classify the electronic information engineering under the electronic information. The school sorts out the common basis, builds the basic platform, opens up the foundation, integrates the curriculum and broaden the speciality coverage. The basic platform, liberal education platform, is set up public basic courses and basic disciplinary courses about electronic information. The school pays attention to teaching basic. Teaching content is to lay the foundation for lifelong learning of students. The school selects the basic theory, basic knowledge and basic skills to benefit students. Facing the need of various development direction of electronic information, the students would play a solid foundation before learning professional knowledge. In addition, strengthening basic education is to strengthen basic theory and skills of students, It also strengthens their basic engineering foundation, cultivates their thinking ability, guides their autonomous learning and cultivates their innovation and entrepreneurship awareness. The professional module, special education platform, following the concept of cross penetration, restructures curriculum based on core course. The course setting includes vertical and horizontal. It can strengthens the course of mutual connection. The school sets some integrated curricula such as subject introduction course, professional introduction course ,etc. It adds some entrepreneurship courses and order courses to broaden discipline field and professional orientation of students. These additional courses can also enhance engineering practice ability. As shown in Table 1, the relationship between the development direction of the electronic information science and technology and the curriculum choice is related.

Table. 1 the relationship between the development direction of the electronic information science and technology and the curriculum choice is related

Specialty	Development direction	Curriculum
Electronic information science and Technology (three stage)	Communication technology	optical fiber communication and optical network
		mobile communication
		software radio technology B
		internet of things technology and its application
		modern communication network A
	Microelectronics	semiconductor materials and applications
		design method of System on Chip
		photoelectric information technology
		RF circuit and device
	Information process technology	modern electronic technology innovation design
		information storage and display technology
		data acquisition and processing technology
		pattern recognition and application
		DSP principle and application PLC principle and application
	Computer technology	Linux programming
		Windows application design
multimedia technology and application (Bilingual)		
Visual Basic programming		
Matlab simulation technology		

In 2012 and 2015 talent training, reform group implements the theory teaching system of basic platform and professional module. It optimizes the current theory curriculum and teaching system. It solves the problem of single cultivation mode for different types of students in teaching. It also adapts to the trend of personality education and enhances the adaptability of students.

3.3 Reform ideas and design for the optimization of the experimental teaching system of multi - level and multi - category

The department of information and electrical engineering owns agricultural measurement and control technology for machinery industry, Jiangsu province electric vehicle drive, intelligent control key laboratory and Daquan teaching practice center. Project team through the establishment for experimental teaching system of inside and outside the class, multi-level, multi-class. Multi-level includes practical skills layer, basic subject layer, application layer and innovation practice layer. Multi-class includes computer based, physics experiment, professional test, production practice, enterprise practice, etc. The teaching system provides a good platform for students to improve practice and innovation ability. The system is constructed by practical skills, subject base, application, innovative practice four levels. It consists of by computer elementary, physics experiment, professional test, production practice and entrepreneurial practice, etc. All of these are intermingled to be the practice teaching system. In this system, engineering cognitive ability, engineering experiment ability, engineering design ability and engineering implementation capacity of students are enhanced step by step. As shown in Figure 4.

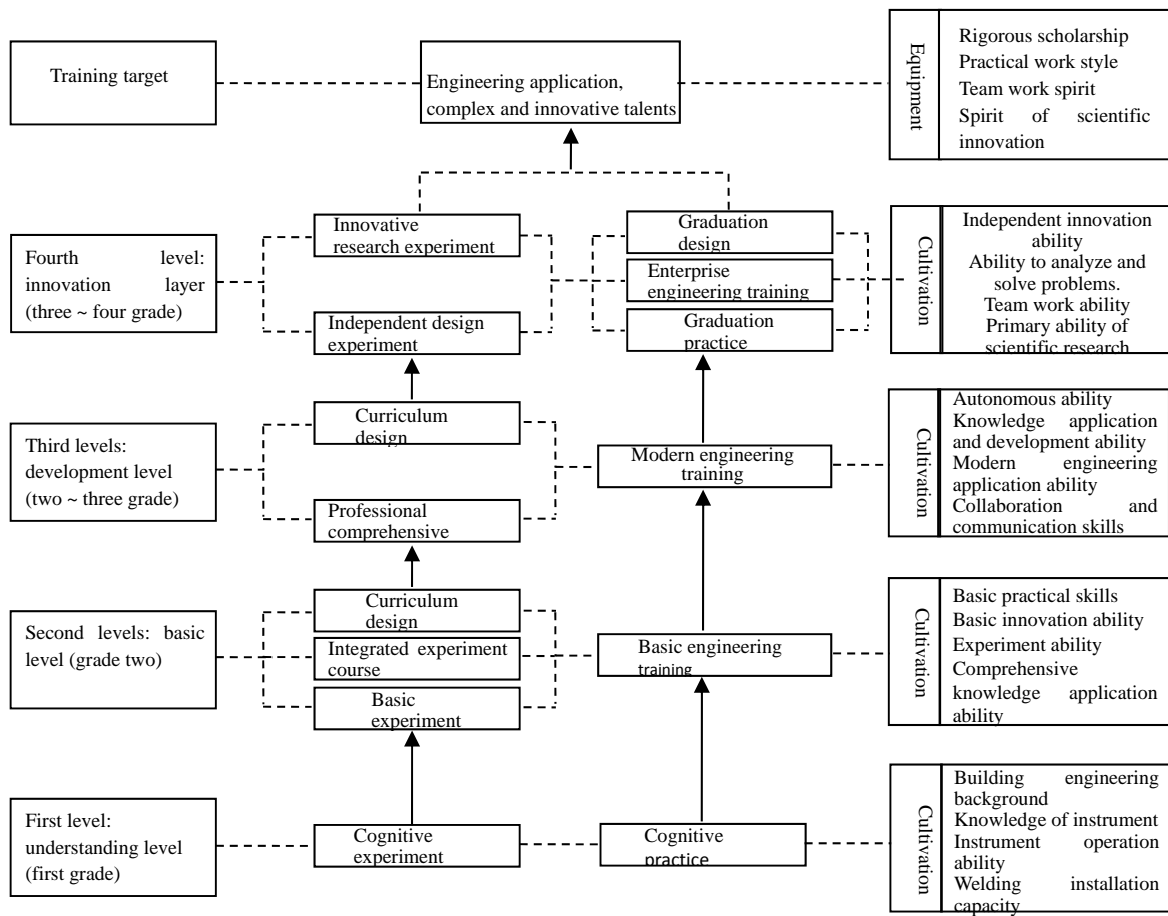


Fig. 4. Around the goal, to improve the practical teaching system of multidimensional ability

3.4 The design and practice for school enterprise cooperation mode of multi-level and diversified

Multi-level and diversified school enterprise cooperation means schools and enterprises interact to meet the demand of enterprise and to enhance ability of students. Figure 5 shows cooperation with Daquan to build the engineering training and innovation platform. Construction for the multi-level and diversified mode of basic platform and professional model realized the agreement of production, study and research. Besides at multiple levels and different enterprises it established diversified cooperation model. It provides guarantee for achieving the promotion of multidimensional ability of students.

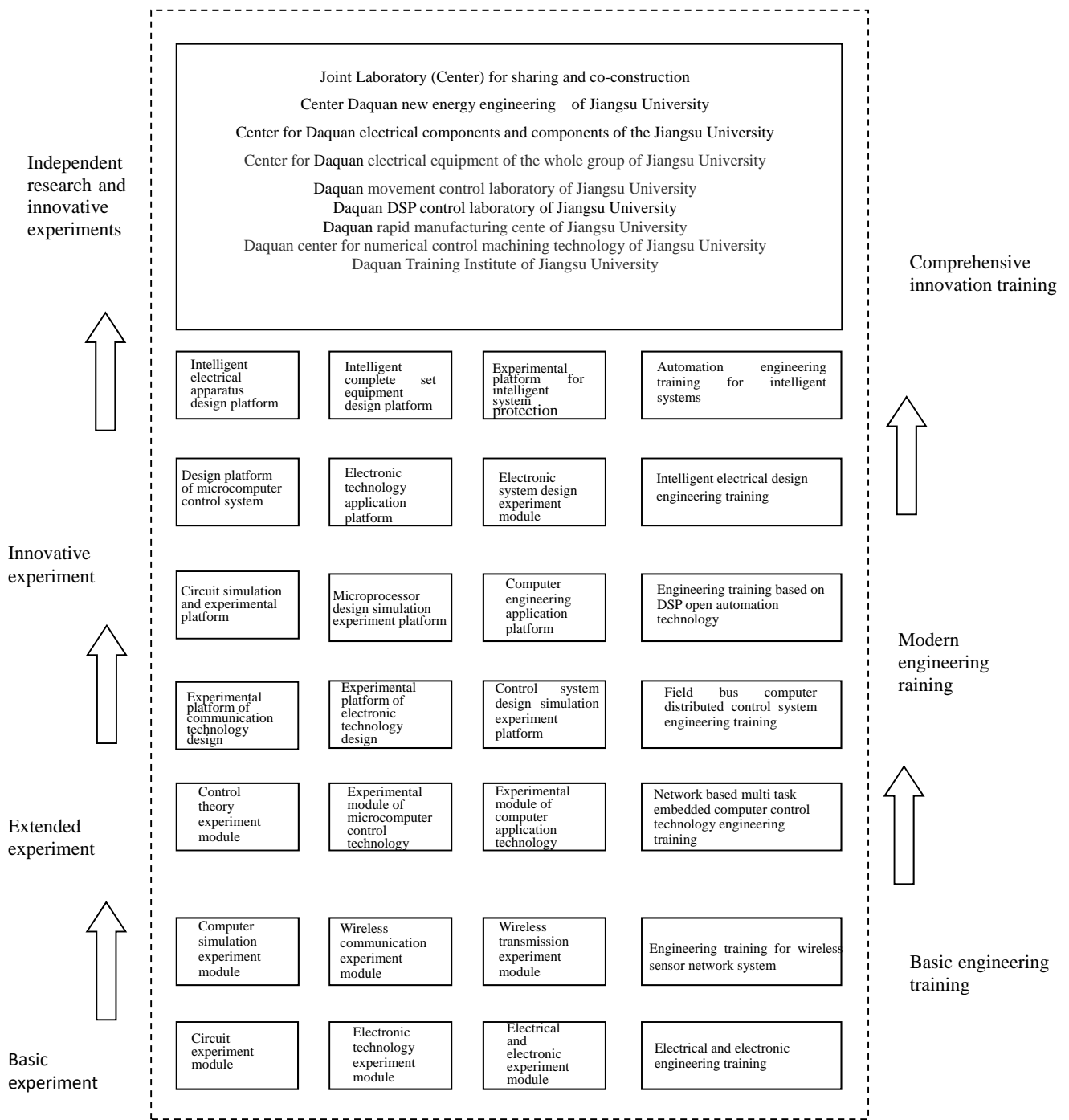


Fig. 5. engineering training and innovation experimental platform

4 Effect of teaching reform

From 2012 to 2015, the exploration and practice for "multidimensional ability promotion: developing electronic information professionals to quickly adapt to society and career" achieved fruitful results. It shows that engineering practical ability and innovative spirit of students have been significantly improved. They achieved a lot of innovative achievements. Graduates with comprehensive quality, solid basic theory, engineering practical ability and good work style has been widely praised by the community.

4.1 The comprehensive quality and multi - dimensional ability of students were significantly

enhanced

In the joint efforts, the quality of teaching and the overall level of electronic information are obviously improved. Electronic information includes electronic information engineering and electronic information science and technology. Comprehensive quality and multidimensional ability of student are significantly enhanced. It directly benefits 300 electronic information engineering students, and indirectly benefits more than 1500 electrical and information engineering students .

Firstly, these two professional students participated in various competitions and innovative research activities. They achieved excellent results and greatly improves their ability. Extracurricular technology competition is a key to get achievements and one of the characteristics of achievements. In the whole process, the extracurricular science and technology competition are always as an important measures. The school put them in an outstanding place of the personnel training and students affairs. In recent years, electronic design contest and science and technology festival have been held. The institution actively organizes students to participate in various extracurricular science and technology competition. These students achieved fruitful results. 8 students in three national university "Challenge Cup" won the grand prize, two or three prize. Some of them won the national total of seventh and the third in engineering in the sixth session. In the national undergraduate electronic design contest, one won national 1st prize, two won 2nd prize. In addition, ten won 1st and 1 won 2nd in their match area. There are 16 students have won the excellent theory of Jiangsu province in second and third prize. In the national college students entrepreneurship program competition won 7 silver and bronze meter in all. There are 110 school science and technology projects and 20 scientific and technological innovation projects are completed.

Secondly, students are good at foreign languages and computer application, and their grade examination results are excellent. Nearly 3 years, there are 300 electronic information students participating in the national computer rank 2 examination. The pass rate was 30.4% once. In English CET4, pass rate is up to 90%.

Thirdly, the published essays and patents of undergraduate students increased significantly. In addition, electronic information innovation design patent has reached dozens this year, and generated five business incubator project.

Last but not least, for undergraduate students of electronic information, the employment situation is good. Students achieve a high quality employment, their monthly income has maintained the highest level of all undergraduate students in Jiangsu University. As shown in Table 2.

Table. 12 Ordinary undergraduate students in this school, the actual monthly income of the top 12

Sort/ Rank	Average monthly income /yuan	Professional name
1	4170	Electronic information science and technology
2	2910	accountancy
3	2820	Computer science and technology
4	2710	Electronic information engineering
5	2680	Financial management
6	2530	International economy and trade
7	2480	Measurement and control technology and instrument
8	2330	Material forming and control engineering
9	2200	Finance
10	2150	Statistics

4.2 Graduate social evaluation is good

The cultivated students are equipped with outstanding engineering application ability. They achieves high quality employment and good evaluation, especially award-winning students in the various competitions. Every year, hundreds of employers come to the experimentation area to recruit outstanding graduates. School and these employers have established a long-term stable contact. Some of them includes the national scientific research institutions, large state-owned enterprises such as ZTE Co., Ltd., China

Mobile, China Telecom, private enterprises. Private enterprises includes Huawei, Foxconn, Qingdao Haier and so on. Many graduates won high appreciation from all sectors of society. They possess high comprehensive quality, noble moral quality, solid foundation of knowledge, pragmatic style of work, team spirit, outstanding practical engineering problem-solving ability. By tracking nearly five sessions of graduates, the employers give the overall evaluation to electronic information graduates. The evaluation is that in the motto of "learned, seeking truth, virtuous", electronic information graduates of Jiangsu university formed a rigorous, pragmatic style of work. Their overall work performance is good. Most graduates can bear hardships and hard work. They can complete the tasks well. In dealing with interpersonal relationship, they can learn with an open mind and respect for colleagues. Especially in recent years, electronic information engineering graduates emerged a considerable strength of the students. They won the reuse in the unit by their good comprehensive quality and working ability.

4.3 Multi level and multi level school enterprise cooperation to cultivate gets high quality and get social recognition

Department of electrical and information, Daquan group, Beijing automotive group and other well-known enterprises adopt cooperative education, build a base, do cooperative research and other measures. It highlights the engineering professional training. School enterprise cooperation takes both the demand of the enterprise for the talent and the undergraduate level of personnel training into account. As a result, the school designs professional according to the discipline, the applied undergraduate talents would have stronger versatility and innovation. In addition, under the premise of the school enterprise cooperation, it is necessary to avoid the cultivation of vocational students. To the end, the engineering applied talents of secondary school should have a more solid and broad knowledge structure. More independent learning ability and job adaptability makes that not only having the skills to do a job well, but also having the ability to technological innovation. With overall quality of higher adaptation to a variety of positions and more ability, students can quickly adapt to the job and solve practical problems. It is initially shown the multidimensional capability to enhance the effects. "Quick adaptation" applied professionals training obtains social recognition.

Acknowledgements

This work was supported by the Priority Academic Program Development of Jiangsu Higher Education Institutions(PAPD), The key projects of higher education reform of higher education in Jiangsu University (2015JGZD003).

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