

Exploration of Constructing Improving-Innovative-Practical-Capacity-Oriented Medical Information Talents Cultivation

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ABSTRACT: The reform in practice teaching approach is the key to promote practice teaching reform and the training model reform of innovative talents. In this paper the teaching model of comprehensive practice project is discussed from the perspective of education, where medical Internet of Things experiment project as an example to study the program of culturing innovative, complex and applied talents, exploring the method of improving medical informatics students' interest and their confidence.

KEYWORD: innovative practice education; medical Internet of Things; comprehensive experiment project

1 INTRODUCTION

In recent years, the population health information entered a period of rapid development. In December 2013, the State Health Family Planning Commission and Traditional Chinese Medicine Administration jointly issued the "Guiding Opinions on Accelerating Population Health Information Construction" specified the population health information construction principle, overall framework, the key tasks and key projects [1]. July 2014, Vice Minister of Education Du Yubo at the national university education work site emphasized that practice education should be promoted institutionalized, normalized and scientific, constantly optimizing the practice teaching, expanding practice education base, strengthening practice education team, improving policy support system and promoting practice education theoretical research [2]. Through searching for literature, there are many articles published in practice teaching such as teaching situation and strategy, practice teaching process, practice teaching gap at home and abroad, single and group course study, etc.. that are comprehensive in research methods and contents. However, there are less research in the medical-informatics-student-subject for practice teaching from the perspective of innovative practice education. In practice teaching, student plays the leading role who is the direct operator and also the subject of practice life cycle. Therefore, innovation-practice-education-oriented is essential in researching practice teaching, developing students creative ability and actual operating ability.

"Medical Internet of Things Comprehensive Experimental Project" is one of comprehensive experimental projects in our college, that five projects had been completed and won awards in the domestic high-level competition. In this paper, the above project as the template, the experimental teaching method is discussed in the perspective of "innovative practice education".

2 "MEDICAL INTERNET OF THINGS COMPREHENSIVE EXPERIMENTAL PROJECT" INTRODUCTION GETTING STARTED

Internet of Things is a network that between object and object, between object and people. Internet of Things technology is the further extension of sensor technology, network technology and software development technology. Internet of Things has been officially listed as one of the national focus on the development of strategic emerging industries. Taking advantage of Internet of Things fully may enhance hospital information construction, promote high-quality medical resources longitudinal flow and promote the development of population health information. "Medical Internet of Things Comprehensive Experiment" provides a platform for medical information students to complete research projects independently, that from requirements, design, development, debug, and document management to oral defense, to experience the whole process of product development which will enhance the students' individual abilities in all-round.

One of our medical Internet of Things comprehensive experimental projects is “Human Physiological Monitoring System” which taking microcontroller IAP15F2K60S2 as intelligent control core, combining with sensor technology, wireless communication technology and software development techniques to form a complete Internet of Things system. The system includes the functions of ECG, oxygen saturation, blood pressure, body temperature, pulse and so on, that is a brand new, intelligent human physiological parameters monitoring system.

Medical Internet of Things comprehensive experimental project needs students having the knowledge of digital circuits, analog circuits, circuit analysis, C language, etc., and also curriculum knowledge of chip technology, sensor technology, communications technology, signal processing, Android development to work together to complete the project. The project is divided into the following stages: needs analysis, principle design, development implementation, actual testing and inspection just shown in Figure 1.

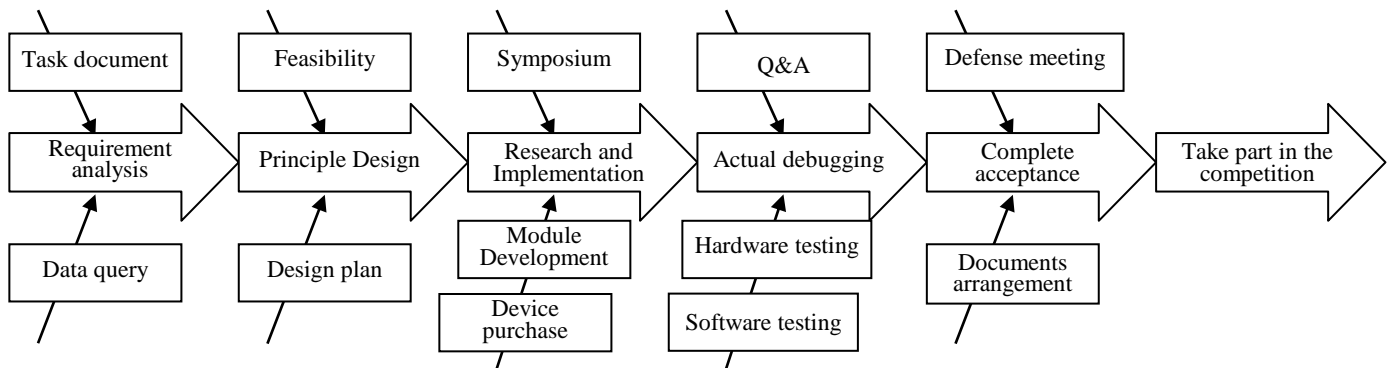


Figure 1. Comprehensive experimental project implementation plan

3 EXPLORATION OF CONSTRUCTING IMPROVING-INNOVATIVE-PRACTICAL-CAPACITY-ORIENTED MEDICAL INFORMATION TALENTS CULTIVATION LAYOUT OF TEXT

position in the whole education process. Then taking “Internet of Things comprehensive experiment” as example, “practice education” oriented, the teaching mode will be discussed in the followings.

Practice teaching is one of effective means to enhance students’ overall qualities. Tao said: “So you want to create, you have to do experiment while you think, and vice versa. Hand and brain working together is the beginning of the creation of education [3].” Vice Minister of Education Du Yubosaid: “Practice teaching should be strengthened, and so does the reform of practice teaching methods. Students should be encouraged to study in practice and scientific research [4].” Education is the fundamental, which occupies an indispensable

3.1 Rational Allocation of Project Tasks

There are more tasks in the comprehensive experimental project “Human Physiological Monitoring System”, involving hardware development, software development and network communication, etc.. As students specializing in different majors, different grades and different interests, so the system modules division needs to be reasonable, rigorous and careful. Comprehensive experimental structure and grouping scheme is shown in Figure 2.

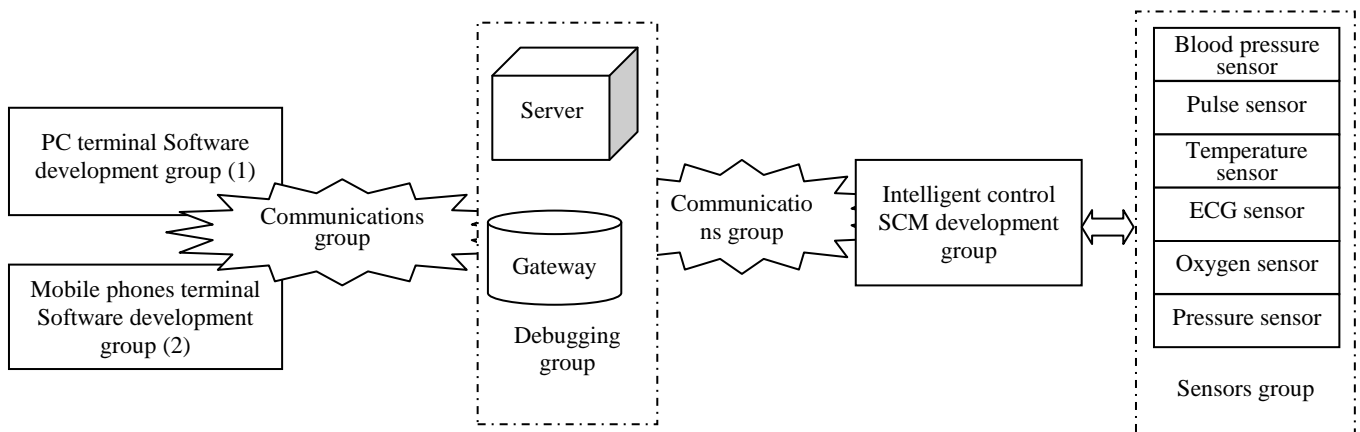


Figure 2. Comprehensive experimental project structure and grouping plan

In the figure 2, the project is divided into six research groups according to the project structure:

The application layer is divided into PC terminal and mobile terminal which mainly for software development using JAVA language and Android system.

Network layer is divided into communication group and debugging group which mainly about Internet communication and Zigbee communication, gateways and routers debugging.

Perception Control layer is divided into intelligent control and sensors which mainly about single - chip microcomputer (SCM) control and sensor signal transmission.

According to their interest and expertise, students could choose research group, that firstly utilize their mastered technical knowledge, secondly increase students' enthusiasm, initiative and self-confidence.

3.2 *Comprehensive Experimental Teaching Promote the Improvement of Theoretical Knowledge*

Reference [5] refers that "We should provide a variety of design project for students, so that they can master knowledge better in practice and active learning case." Here by project motivation, students will learn actively. The project will provide a teaching platform of practice-theory combination for students, and meanwhile students desire for knowledge is stimulated.

In this comprehensive experimental project, students consult relevant information to finish the principle prototype design and software flow diagram, and then determine the final scheme by discussion. During the design process, due to lack of knowledge reserves, students need to learn a lot of new theoretical knowledge based on the project requirements such as ZigBee, intelligent control chip, sensor technology and signal transmission etc.. During the actual development process, students learn simulation software Multisim to verify circuit, choose components, modules circuit experiments and module circuit welding by themselves which need the support of theory knowledge in every practical part. Therefore students must read the relevant books carefully laying solid theoretical foundation. In active learning process, through comprehensive experimental training, students found their knowledge defect, continue to add knowledge, and then form their own knowledge system achieving the really concept of "learning in doing" [6].

3.3 *Comprehensive Practice Teaching Motivate Teamwork*

Society development needs complex and application-oriented talents. "Learning behavior is

born from the material about related scene cases, and usually being collective." [7] "Internet of Things Comprehensive Experimental Project" is formed by multi-disciplinary integration which accomplishment probability by completely individual is very small. Therefore, through teamwork, team members learning together, practicing together and solving complex problems together is a prerequisite for project completion. In the process of project implementation, from sensor selection, signal acquisition, signal conversion, signal transmission, signal trigger of the perception layer to the PC terminal and phone terminal of the application layer, cooperation is required in the entire project life cycle. Under the instructors' help, team members exchange, discuss and verify together where everyone's idea is shared by the team. The team build knowledge network together and a kind of group knowledge system is formed.

In practice, the student is strengthened as the object and the core of the project. In the study seminar lectures will be given by the students which will develop their verbal expression. In the technical analysis seminar, focus and difficult points will be presented by the students which will develop their problem-solving skills and logical thinking. In the debugging and validation seminar, students will do it by themselves which will develop their observation skills and practical operational capability. Team completing the project together cultivates members' cooperation ability, improves their communicating ability and also motivates their leadership ability.

3.4 *Comprehensive Experimental Project Participating Science and Technology Competitions to Enhance students' Confidence*

Science and technology competition provides a platform for the comprehensive experimental project and also is an opportunity to test the team's research achievements. Through competition, students' innovation sense will be cultivated reflecting their actual ability to enhance their self-confidence. Through the practice of Internet of Things comprehensive project—"Human Physiological Monitoring System" in a semester, each group of the project cooperate, communicate with each other, debug carefully, and finally considered acceptable by the teachers. In 2014, the comprehensive experimental project stood out in "Bi Sheng Cup" National Electronic innovative design and Internet of Things application system design contest praised by experts, and won first prize.

4 CONCLUSION

In recent years, practice-oriented education teaching model is emphasized in our Information Science and

Engineering College, that training model of “teacher-student team” and “comprehensive experimental project” were studied in practice. Practice has proved that the comprehensive practical project provides a cooperation, communication and self-confident development platform for students that is student-object, project-focused, and cultivates students’ personality, professional quality and research quality in all aspects. Meanwhile, in terms of employment, students trained by comprehensive practical projects could access to research department directly after graduation, engaging in product development work whom will certainly be welcomed by business.

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