

# Medical colleges summary of biomedical engineering profession

—Luzhou Medical College in the perspective of biomedical engineering profession

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## ABSTRACT

**This paper expounds professional characteristics of biomedical engineering in our school, and analyses some problems lying in it, emphatically discusses advantages and the problems combining biomedical engineering with the medical courses in order to offer targeted solutions. It summarizes the results and problems so as to provide reference value to a new major.**

**Keywords:** Biomedical Engineering; Connotation; Talents Cultivation; Specialty Construction

## 1. INTRODUCTION

Biomedical Engineering originates in the 1950s. It is a new interdisciplinary based on modern science and engineering research to study and solve medical problems. It is a product of biomedical science and engineering. The purpose is to train the Compound Biomedical Engineering talent [1]. Biomedical Engineering in our college established and formally recruited students in 2004, and has enrolled 238 students in the seven years. During this period of time, we encounter many difficulties and also get some experience. It is summarized as follows.

The basic connotation of Biomedical Engineering in Luzhou Medical College: Penetrating engineering into the medical science—systematically and comprehensively teaching them and engineering and medical knowledge and skills, we are aimed to develop the students into Compound Biomedical Engineering talent who know basic medical knowledge and master electronic information technology, electrical engineering technology [2]. The professional features: students master the fundamental knowledge of medicine and biology, then solidly learn professional electronic and information knowledge according to medical discipline characteristics. Therefore, we offer courses on mathematics and

information technology, physics and electronics, medical engineering, medical instrument 4 Teaching and research section. Based on the four teaching and research sections and four professional laboratories, we also use situational teaching method in professional courses with the help of related laboratory, School Affiliated Hospital, Market resources [3]. Using modern information technology, we train students to make the virtual demonstration classroom experiment teaching model and write virtual control program. In addition, we send students to practice in Luzhou Vocational and Technical College. Through a system of professional learning and practice, students have solid interdisciplinary knowledge and skills. Now we have three professional minors: Formation Clinical engineer (Hospital equipment section), Image, radiotherapy technician (Department of Radiology, oncology), Hospital information management (Information section).

## 2. THE PROBLEMS AND SOLUTIONS (OF BIOMEDICAL ENGINEERING)

### 2.1. Improving the Quality of Teachers, Teaching Combining with the Medicine

Biomedical engineering is comprehensive discipline combined with science, engineering, medicine. It focuses on science and engineering application in medicine. Imperfect knowledge structure makes the science teachers lack of understanding and application of new clinical technologies, which causes the disconnection between theory and practice, affects the improvement of teaching quality. In this case, we require new teachers at least learn 1 - 2 medical courses each term, sum up problems in the course related to science and engineering, and write analysis report. At the same time young teachers under the age of 40 must participate in a variety of academic reports in medical science, considering it as the basis of assessment, evaluation and professional titles. By this way teachers could have a definite object in view

in their teaching, taking the medical science and practical application in. At the same time, the Department organizes discussion among the teachers and the experts of medical departments to analyze science and engineering problems existing in teaching and research in the major. The Department assign teachers work with them to solve their problems while enhancing the teaching level, scientific research ability and the comprehensive quality of the teachers. It reaches the aim: teaching with combination of science, engineering, and medicine.

## 2.2. Talent Training Scheme

We have had four sessions' graduates. The graduates' suggestions for us will be appropriate and valuable; the employing units' evaluation on them will be our reference. We have made the investigation and statistics in the practice units, the employing units and students in order to get data about the professional knowledge structure and the competencies structure of the major, the desired quality structure of students, and the professional main courses and practical aspects. According to the above information, data and results, combined with the basic requirements, professional features, the school orientation and characteristic, we study aims of each course and the practice, realizing the practical significance of training goal. At the same time, we also decompose the goal to implement every class and every practice, and then determine the basic teaching requirements for each course and the practice. To ensure the continuity system and integrity of knowledge, we make sure that there is no fault and redundancy related to each link of teaching process.

## 2.3. High Requirements for the Professional Laboratory Construction, Much Investment in Construction

The professional software and hardware equipment continue to be updated, which requires a large amount of funds and support of professional technical staff. In the initial stages of professional construction, a problem usually arises—much investment makes little result, which bring difficulty to the construction, even controversy whether to continue to run it [4]. In this difficult situation, we strive for funds and policy to the college, cooperate actively with the affiliated hospital and relative universities or medical institutions, even medical company. Buying the necessary new equipment and using ordinary old equipment, we have established a comprehensive computer laboratory, University Physics Laboratory, laboratory of medical signal processing, electronic technology lab, digital signal processing laboratory, electrical repair laboratory, medical instruments and laboratory and so on. As to the use of special equipment

and maintenance, we employ experts for special care—professors and senior engineer of the Affiliated Hospital, medical institutions and related company while let the student go to the site to learn to use and maintenance. It not only solves the limited construction funds, but also receives professional technical staff support. The most important point is to let the potential employer to know our students in advance, successful implementation “use our advantage to avoid our deficiencies”.

## 2.4. Instability of Students Professional Thought

Biomedical engineering is a new interdisciplinary subject. It involves various fields, with complex knowledge system [5]. So it is uncertain in the employment direction since the beginning, which allows parents and students lack of understanding and confidence in the major. Part of the students have instability in the professional learning, have not enough learning enthusiasm and initiative, affecting the overall atmosphere of learning, even bringing negative effect to professional construction and development. In order to solve these problems, we adopt the following measures:

1) We elaborate enrollment brochures, and adopt many channels and ways to propaganda, increasing propagandist strength.

2) We strengthen professional thought education. Dean and directors of departments give lessons on the fresh. Also, the students are equipped with full-time counselors who hold regular forum for students to consolidate professional thought. At the same time, we organize questionnaire, regular understanding about students' ideological trends.

3) We pay more attention to students' employment. Now we have discovered that the employment is the key factor to the stability of the students' professional thoughts. We make brochures for each graduate, including: cultivating goal, main courses, practice base, employment options and basic information of them. Then we use various channels and ways to distribute these materials to potential employers, and invite school employment office, School personnel and the previous students to hold meet to introduce experience. As the students hold simulation recruitment, the Department of school leaders, experts and students (turns) compose of jury to examine students.

## 3. PRELIMINARY ACHIEVEMENTS

After years' efforts, teachers' quality has been further improved, and the model of talent training has been recognized, which makes the professional construction further molded. Moreover, Students gradually have stable professional thought and gradually achieve good employment. The specific changes and achievements as the following table:

Graduation year	Number	Postgraduate student	First class hospital	City level hospital	Scientific research institution	Medical equipment company	Other
04	30	3	1	9	1	12	3
05	33	6	7	11	3	3	3
06	29	3	14	6	1	3	2
07	28	5	12	6	1	3	1

Among them, we can find out that while maintaining the stable number of postgraduate per year, we have expanded employment level and range of our students. From the initial main employment in equipment department of units of choose, engaging in equipment maintenance, our graduates now are in equipment department, Radiologic department, information department and radiology sharing, which shows students' profound knowledge and comprehensive quality has gradually recognized by employers.

#### 4. DEFICIENCIES AND THINKING

##### a) The lack of compound teachers combining medical with engineering

We are lack of compound teachers not only knowing the engineering knowledge, but also mastering the medical equipment repair. Due to technology blockade of medical equipment manufacturers, at present, the hospital is also lack of such talents [6].

##### b) Lower degree for post setting/(insufficient attention to engineering post)

The phenomenon is widespread in the majority of our hospital that leaders value medicine and neglect engineering. As an auxiliary departments, medical equipment department often goes unnoticed, lack of staff and promotion. It is greatly weakened the enthusiasm of project technology staff, resulting in massive brain drain.

##### c) Need to continue to build science and engineering education resource base

##### d) Need to pay more attention to cooperation with enterprises and combine with the market

In our country, there are many examples of Cooperation between enterprises and universities. High grade students practice in enterprise should be the most economical and effective combination way. Let the students get training in line with industry technology. It does not only provide students with a better experience for their future employment, doing some preparation, but also gives them a competitive advantage. At the same time, it also provides potential candidates for the company. The school and the growing biotechnology industry establish long-term cooperative relations, advantageous to grasp dynamic market and its requirements and conducive to

timely adjust the teaching plan and research direction. It can be achieved simultaneously results in many aspects.

#### 5. CONCLUSION

In conclusion, based on our research, exploration and summary on several problems of Biomedical Engineering in our college, we have to admit that although we have gained some experience in biomedical engineering professional teaching reform, personnel training mode and so on, we have to make further comprehensive research on how to combine the school's professional background to start with a certain characteristics of the biomedical engineering which can meet the levels of needs of society for medical engineering in research, clinical application, maintenance services, market promotion and so on. It is a very long innovation reform process. We must unremittingly to execute reform and innovation of talent cultivation mode, to highlight the professional characteristics and advantages so as to win wider recognition of society.

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