Interdisciplinary Curriculum Setting and Construction of Biomedical Engineering Education at Medical Colleges and Universities

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Abstract. With the development of modern science and technology and the transformation of traditional disciplines, interdisciplinary development is the main trend of science in the world now. The multidisciplinary crossing has become the power to promote the development of discipline. The development of multidisciplinary crossing specialty and interdisciplinary education has increasingly become the urgent request of institutions of colleges. Biomedical engineering specialty is a multidisciplinary specialty, which need to renew educational ideas, integration of resources, improve the management mechanism and solve the problems of the disciplines development and curriculum construction.

Introduction

With the development of science and technology, the problems of human society become more and more integrated, complicated. Only a single discipline is not enough to solve the practical complex problems. The trend that multidisciplinary joint problem solving (the science and society problem) commonly has become increasingly apparent. Science research emerged development signs from highly differentiated to cross comprehensive, thus the formation and development of cross disciplines were respected gradually by all walks of life. Each specialty in colleges and universities, establishing interdisciplinary courses, developing interdisciplinary education is imminent.

Biomedical engineering specialty is a cross discipline of science, engineering and medicine. It is a cross discipline of prevention and medical treatment and protect people's health by the theory and method of engineering technology. Biomedical engineering research direction: computer network technology and all kinds of large-scale medical equipment, digital medical center, medical image processing and multimedia application in medicine, biological information control, biomedical signal detection and processing of neural network, biomechanics, tissue engineering, biomedical composite materials, et al. With the development of science and technology, each big hospitals and company needs more and more biomedical engineering talents. Biomedical engineering specialty has some problems of interdisciplinary curriculum setting and construction that need prompt solution.

The problems of interdisciplinary specialty development: The traditional disciplinary layout and interdisciplinary specialty development

The Classification of Instructional Programs has not corresponding subject position and interdisciplinary there would be no "legal status", which are often placed in a marginalized position,
innovation and development of cross subject is impossible, the set of disciplines profession is very
detrimental to the survival and development of interdisciplinary education, so as to not get the
recognition and security of system. In recently years, although the state started to gradually promote
interdisciplinary research and development of interdisciplinary specialty, the effect is not significant.
Under the existing scientific research and teaching management system, professional discipline is the
basic premise and important basis of the talent training, project (funds) to apply for, title evaluation,
academic degree setting [1]. Medical colleges and universities, the advantaged disciplines are clinical
medicine, anesthesiology, imaging, oral medicine, etc. Therefore, the policy, institution and the
funding distribution are inclined to all these disciplines, and the survival and development of
biomedical engineering specialty—the interdisciplinary specialty, also need to give more support.

The problems of interdisciplinary specialty development: The management mechanism and
evaluation mechanism

The basis and premise of the interdisciplinary specialty are numerous resources sharing in the process
of the teaching and scientific research. But, under the existing management system, because of the
disciplines and specialties belonged to different departments, the teaching and scientific research
equipment, facilities and so on also distribute in their respective labs. The administrative division of
the management system weakens the exchanges and communication between disciplines and
disciplines. The interdisciplinary specialty development not only lacks the platform constructions that
possess practical utility and good development foundation, but also lack the unified top design and
construction goal. At present, the biomedicine engineering education mainly depend on the amateur
hobby of some teachers in the field of interdisciplinary, which lack of a relatively stable and mature
research base and research staff, thus the specialty construction and development are in dilemma.
Lacking of long-term top design and reasonable equipped with all kinds of resources is difficult to
fundamentally solve the problem of lack of interdisciplinary construction platform.

Interdisciplinary as a result of a multidisciplinary interaction fusion, that has a high
interdisciplinary nature. The more the subjects’ research, the more difficult understood of the
interdisciplinary. Even if a particular is a discipline professional expert, due to the different of their
own knowledge structure, he may also be "outsider" when facing interdisciplinary field. So, the
interdisciplinary involving many of the content that is often difficult to achieve consensus, thus which
give relatively independent evaluation system and standards formulation of interdisciplinary some
problem.

The curriculum setting and construction problem of interdisciplinary specialty: Strengthening
the construction of teachers and improving the teachers’ quality

At present, as a result of the limitation of traditional education mode and subject classification, most
of the teachers' knowledge structure is relatively single, knowledge narrow, which also affect the
quality of the interdisciplinary specialty personnel training in a certain extent. Thus, the biomedicine
engineering specialty should consider the discipline orientation, targeted to do the work of talent
introduction and teachers training. The interdisciplinary specialty teachers should not only have good
presentation skills, strong ability of organization and management, proper evaluation ability and other
teachers' professional abilities, but also should have solid multidisciplinary professional knowledge.

Biomedicine engineering specialty is a emerging discipline of biology, medicine and engineering
technology combined with each other, infiltration, and crossing. That is one of the important
backbones of the discipline of modern medicine and hospital construction development. Biomedicine
engineering orientate in the direction of medical equipment, medical information technology, so
teachers should possess solid profession knowledge of biology, medicine, mathematics, physics,
electronics and computer science and engineering and so on and familiar with medical equipment
design, production, use and maintenance and the management of the hospital, etc.
The curriculum setting and construction problem of interdisciplinary specialty: To strengthen the curriculum system construction

The biomedicine engineering specialty belong to a characteristic disciplines, features of curriculum structure system show the cultivation of basic skills of the core curriculum, that aspire to consider professional design requirements, highlight the intersection integration of multidisciplinary curriculum, cultivate applied talents. Establishing a teaching system of subject discipline group, which break of the conditions of various courses independently and no relation each other of biology, medicine, pharmacy, engineering and so on, and establish the curriculum group. Biomedicine engineering specialty course group: mathematics curriculum group (advanced mathematics, linear algebra, probability theory and mathematical statistics, fuzzy mathematics, etc.), the biology curriculum group (normal biology, cell biology, genetics, physiology, etc.), medical courses group (human anatomy, introduction to medicine, pharmacology, etc.), electronic and computer curriculum group (data structure, digital circuit, digital signal processing, medical instrument, etc.). In the preparing of courses group, paying attention to the relationship between curriculum, the integrity of knowledge, especially the teaching content crossing in group and between group to group, curriculum group teaching avoided problems of the omission of subject teaching contents, repeated, cohesion improper and so on, which conducive to the mutual penetration, mutual fusion, mutual complement between multidisciplinary. Course integration within the group, that is advantaged to form a more complete and effective knowledge framework and research concept in the learning process of students, which to adapt to the highly differentiated and highly integrated characteristics of modern science technology and highly comprehensive development trend, the integrated curriculum changed the phenomenon of branch carefully and course too much, period of cutting which give students white space to learning autonomously and pay attention to the cultivation of the students’ practical ability and innovative thinking ability [2].

Biomedicine engineering specialty is the science of more practicality, needing to accumulate and understand in practice. According to the requirements of training compound and practical talents, the curriculum should also pay attention to strengthen students' manipulation ability and the cultivation of the innovative thinking ability, and increase the proportion of compulsory course experiment, and open skills experiment of much of contents. In addition to, biomedicine engineering specialty should actively joint outside enterprises, explore the methods of university-industry cooperation in running schools, provide platform for practice and employment of our students to grow up.

Summary

Interdisciplinary specialty is the basic condition of scientific knowledge system integration, as well as the path of major scientific and technological innovation. Biomedical engineering education should solve the problems of the policy, the management mechanism, the construction of teachers, and the interdisciplinary curriculum setting and construction (see Fig 1). Medical colleges possess of natural advantages of completely related disciplines of medicine, profession diverse and high-level talent agglomeration, high level of teaching and scientific research, so it possesses of unique objective conditions to develop interdisciplinary of biomedicine engineering etc. And how to give full play to the advantages, integrate subject resources, strengthen the crossing fusion between subjects profession, and is the problem of currently worth further discussing.
Figure 1. The construction of biomedical engineering education.

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References