

Chapter 5

PBL Implementation in Material Science and Engineering Education at Chinese Universities

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ABSTRACT

Traditional university education with ordinary lectures is changing to more practical and actively student-centered learning systems. Materials science and engineering is originally the study of actual engineering materials but now becomes more interdisciplinary and sophisticated in the rapidly advancing industrial society. It is very necessary to cultivate the practical materials engineers and it also becomes a big challenge for Chinese universities to make a change. PBL is one of the potential approaches for Chinese universities. This chapter describes PBL theories, discusses PBL principles, PBL models, and also some PBL experiences at Aalborg University. In addition, this chapter exposes how PBL could be applied to materials science and engineering education in Chinese universities, and a case of PBL implementation has been given to show the process of transformation from traditional education at Chinese universities to PBL in the materials science and engineering field.

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INTRODUCTION

Higher education reforming has become one of the human concerns all over the world recently since education in University gives the main priority direction for the development of economic society and humanities in all developed and developing countries. The trend towards globalization with technological developments requires more practical and innovative experts who have professional skills and even much creativity in every field of the industry.

Under above educational environment of the world, how to speed up the reform and innovation of engineering education in Chinese Universities is also an issue of concern. Nowadays, the concept of “Emerging Engineering Education, 3E”, which has been put forward (http://www.moe.gov.cn/s78/A08/moe_745/201702/t20170223_297121.html) by Chinese Ministry of Education in 2017 has provided us the new sight for reform in engineering education. 3E is a national strategic action in China, which actively responds to a new round of worldwide Science and Technologies revolution and industrial transformation. It is characterized by new technologies, new industries, new situations, and new models. It involves a new idea of engineering education, a new structure of the programme, a new model of student cultivation, a new quality of education and teaching, and a new system of hierarchical development. In addition, the upgraded traditional engineering programmes also belong to this category.

Materials Science and Engineering is one of the traditional engineering programmes but now it should be upgraded and changed to be interdisciplinary with other new technologies and new industries with the development of the industry. That is because materials are one of the bases of many fields of industries, thus materials are every necessary to be used especially in new industries. Thus the Materials Science and Engineering education in Chinese Universities should be necessarily to be reformed at present. That is well coordinated with the essence of the political efforts calling 3E construction, which is to build up the ability of the students to learn new things based on the background of the new economy, new industry and so on. In other words, it aims to cultivate innovative graduates for China society. For example, Materials Science and Engineering graduates are not only required to know and understand about the actual materials used in the industry, but also they could create new materials in order to meet the demand for new industries. Accordingly, students are required to study in learning environments facilitated by curriculum designs with the integration of professional skills, scientific and

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