

Chapter 7

An Elective Course–Based Model for the Change of Traditional Engineering Curriculum Towards PBL in a Chinese University

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ABSTRACT

The chapter presents two PBL models for the change of traditional engineering curriculum based on traditional courses across colleges at the Northeastern University in China. A particular focus of the PBL model design is about interdisciplinarity. In this regard, the E2-iPBL model is developed based on general and major elective courses offered across many disciplines, whereas the JD-iPBL model is considered to develop PBL courses by further introducing compulsory major courses for a joint-degree training program. For practical implementations within the traditional engineering curriculum background, the change of the teacher's role for student-centered constructive learning is briefly summarized. Possible realizations and simple cases are illustrated. Finally, a comparative study of the E2-iPBL and JD-iPBL models is outlined.

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BASIC THEORIES ABOUT THE PBL

This PBL course at AUU is organized with nine thematic workshops and many observational activities of lectures and examinations in the Civil Engineering department of the Aalborg University. At first, the PBL theory courses mainly focus on PBL model, approaches, the design of PBL problem, collaboration and project management techniques, the course and curriculum design, facilitation and teacher roles in the PBL, assessment for different learning goals, and the management of change at course and institutional levels. Therefore, by providing basic knowledge and understand of student-centered learning methodologies and PBL related theories, techniques and required skills, learning goals of the PBL course are to: (a) Understand active learning methodologies, in particular problem- and project-based learning; (b) Understand curriculum design and management; (c) Understand and experience PBL as a learning process and the learning of PBL skills; (d) plan an implementation of the designed curriculum/course change.

A teaching portfolio is a tool for personal reflection and development for professional teaching skills. The reflection is normally following the Kolb's cycle "experience- reflect - generalize - actively experiment – new experience". Materials within the teaching portfolio are based on personal teaching practices and experiences that are towards teaching professional development. Especially, key elements in the Kolb's cycle can be realized as (a) Experience: what have been experiencing in teaching. Related materials are the teaching philosophy, teaching material, and teaching strategies; (b) Reflect is used to answer the questions of what is good about your teaching, what the main challenges, which teaching strategies work and don't work; (c) Generalize refers to why things go as they did, and why challenges are challenges, why did the strategies work and did not work; (d) In the stage of the active experiment, you need to answer questions of: what you can use to improve your teaching, what can you use to design your teaching implementation, and how can it be used and when.

Generally, basic theories about learning consist of the behaviorism, the cognitivism, and social constructivism learning theories. In the behaviorism leaning, all things that organisms do including acting, thinking and feeling are regarded as behaviors. To change behaviors, the environments are modified, or behavioral patterns are changed. In this regard, the behaviorism assumes that a learner is essentially passive, responding to environmental stimuli. Besides, a learner starts with a clean slate, and behavior is shaped by positive and negative reinforcement. Therefore,

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