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Development and Implementation of a Coaching Model for Project-Based Learning in Science and Engineering Education

M - C. Peeters

Head of the Department of Education
KU Leuven, Faculty of Bioscience Engineering
Heverlee, Belgium
christine.peeters@biw.kuleuven.be

W. Van der Hoeven¹

Educational Research Assistant
KU Leuven, Faculty of Bioscience Engineering
Heverlee, Belgium
wouter.vanderhoeven@biw.kuleuven.be

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Higher education in science and engineering has changed fundamentally during the last decade as a result of the Bologna Declaration, the subsequent educational reforms and our ever-evolving labour market [1]. To meet these educational needs, the Faculty of Bioscience Engineering of the KU Leuven and the Leuven Engineering and Science Education Centre (LESEC) have been investing heavily in the implementation, development and optimisation of a student-centred teaching method: project-based learning (PBL). Because the correct interpretation of the coaching role is crucial for the success of PBL, an educational research project (OWP/2010) was started to define and optimise the role of the coach in PBL [2].

In PBL a group of students works on a problem for a longer period of time, in consultation with a coach who guides and facilitates the learning and the self-development of the students [3]. Therefore, the correct interpretation of the coaching is crucial for the success of the project. But in spite of all the scientific studies that have been done about this teaching method, insufficient light has been shed on the interpretation of the role of the coach [4].

What is needed is a model which helps the coaches with defining the best coaching method for each specific project or group of students. The objective of this research project is to develop, implement and validate a coaching model in the science and engineering education of our university [5].

¹ W. Van der Hoeven, wouter.vanderhoeven@biw.kuleuven.be

Firstly, a theoretical framework was created that collects all the different aspects of coaching into specific coaching roles. This overview collects and uniformly defines all this different roles and served as the theoretical foundation of the further research. Based on this framework a survey was conducted (800 students, 50 coaches) to study the role of the coach in PBL. An in-depth statistical analysis of these surveys was done and used to map out the relationship between the key factors of the research: the coaching roles, the learning objectives and the learning outcome. These results were used to develop the proposed coaching model, which presents the coaches with the best method for coaching the students in a specific project, based on the learning objectives of this specific project (See Fig. 1).



Fig. 1. Schematic overview coaching model

The next step in our research project will be the development of an accompanying web application and manual to facilitate the use and dissemination of the coaching model in the educational practice. The goal of this web application is to transform the theoretical coaching model into an easy-to-use instrument whereby the coach can determine the optimal coaching profile based on the characteristics of their project. In addition a manual will be developed that serves as an easy-to-use reference work and provides the coaches with the necessary information and guidelines to successfully take on these coaching roles. ■

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