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Editorial

In order to set the stage for the current issue on PBL we refer to the paper by Cockayne, Feland and Leifer published in this issue.

Problem Based Learning has moved to the forefront of engineering education, in practice if not in name. The present-day offering of problem-based courses exist under many names: capstone courses for undergraduate seniors; project courses that span multiple quarters or semesters; courses built around industry-sponsored research or design; and the most recent trend for creating entrepreneurship programs focused on the student creation of 'fundable' companies. Today's engineering student, both graduate and undergraduate, will surely be introduced to a PBL course, with a large number participating in at least one.

The creation of most PBL classes is built around the delivery of a real-world learning experience to the students. The performance requirements of the tasks in the class are meant to replicate those of the real world. Therefore, a primary goal for educators is to create a situation where the skills (know-how) and knowledge (know-what) that is experienced in the class is analogous to that learned in the real world. The advantage of a classroom environment is that learners can be provided with additional support, time for reflection, lessons, or feedback that may not be possible in the real world. This time for intentioned reflection of the experience is one of the key elements responsible for the success of PBL. The experience can be viewed from the perspective of contextual skills and content knowledge. Content knowledge, or know-what, is integrated into the learning experience through lectures, books, manuals, or other hard materials. The complement to this explicit knowledge is know-how, or implicit knowledge. This implicit knowledge is captured in skills that students are expected to already 'know' or learn in the class.

PBL is therefore a life or near life experience for students. It must have evolved from the 'case study' or 'example' based learning practiced by many applied engineering colleges for many years since the beginning of engineering as an academic discipline. Heinrich Blasius, who taught in Hamburg,and was a student of Prandtl at the beginning of the 20th century was a proficient and well known theoretician in applied and fluid mechanics but based his teaching on examples leading to a culmination of supplying the theoretical foundation at the end of his course-this was the nucleus leading to PBL. One of the ultimate practices of PBL is the project courses spanning multiple semesters building around industrial needs. But, there are questions that arise when PBL is practiced-how much PBL is expedient for a degree course, how does PBL fit into our established concepts of academic studies, and how does PBL affect the performance of brighter and more average students.

Erik de Graaf of Delft Technical University, the Netherlands Anette Kolmos of Aalborg University, Denmark and Renate Fruchter of Stanford Univeristy, USA are the PBL expert guest editors of this issue. My gratitutde and thanks to them for the diverse papers they have selected. Assembling a special issue is a daunting task, the relief only comes when one is able to inspect the complete published issue.

Michael Wald