Chapter 3
Mechanical Engineering Students Project-Based Learning in OUAS: Learning by Doing

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ABSTRACT

This chapter introduces project-based learning approach which is used in the Oulu University of Applied Sciences (OUAS), School of Engineering and Natural Resources, Mechanical Engineering Department to get local companies to offer project works to mechanical engineering students. The concept is based on organizing a local event or online event for the companies to come to OUAS campus to present their challenges needing engineering students to solve. The companies are then competing, selling, or pitching their problem for engineering students as the engineering students will then individually select the most interesting cases to be solved, and which has linkage to potential summer job and thesis work opportunities if projects are successful. The concept has proven to be successful, and it has been established as traditional event with many companies returning to the pitching event annually to get their industry problems solved by group of motivated engineering students.

INTRODUCTION

Learning-based projects provides mechanical engineering students with the skills and experience to prepare them for the demands of working life. Project-based work is currently one of the most important and desired engineering skills in business life. Similar to learning to ride a bike, making mistakes

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is an integral part of the process of gaining new experience as a professional in the field of mechanical engineering. It is thus important to create an environment where it is safe to students act and where an experienced mentor can support professional growth of students to help students dare to make mistakes and learn from them. Universities are able to provide students with an education on the theoretical foundations of engineering through classroom instruction, but as this education progresses to more specific vocational instruction, classroom instruction and lab exercises are no longer sufficient to satisfy students' thirst for knowledge.

Universities must offer students the opportunity to learn through experience as a part of their curricula. This is especially true for mechanical engineering students, who are typically interested in very practical work. This pragmatic perspective thus also influences student's intrinsic motivation to study in general. Therefore, it is imperative that universities also have well-equipped, modern laboratory facilities to support students in their learning and, specifically, include project-related work for mechanical engineering students. This practical work improves both students' theoretical knowledge and their professional career' after graduation. These abilities ultimately also impact the problem-solving abilities of students, and problem-solving is a fundamental part of the working life of an engineer.

Students aim to acquire skills in class that promote their employment after graduation. The competence that is valued in the "the real world" of post-graduate work/careers is created through experience. In the current world of work, it is not always sufficient to possess higher education in a particular field. From the employer's point of view, in addition to education, a student must have experience in the field to make them an ideal employee choice. The jobseeker who has completed university training and has also relevant practical experience is able to better demonstrate their motivation in a given profession and reduces the perceived risk in their hiring as an employee. If the candidate already has experience, this provides the foundation for immediate productivity and suggests developed problem-solving skills, which in general is the goal of education. The main task of engineers in working life is to solve problems with a team. A proficient engineer should first know the basics of design and then learn to fix problems that result from deviations from these basics. In addition to this, engineers need to identify the root-causes of problems that arise from processes of the companies. Often, if only the visible problem is solved, it may repeat itself or move the problem to another process phase, in which case the root cause has not been solved correctly. Engineers need to learn systematic thinking—that is, the overall impact of systems on each other. Knowledge in this domain is gathered through education and experience. However, a single engineer is not able to fully perceive or understand complex systems; therefore, a good engineer has good human skills in addition to problem-solving skills. Thus, overall, the ability to work on a team and identify and solve problems together are the key skills for a professional engineer in the engineering industry.

The goal of the project-based learning course case presented in this paper is to facilitate the employment of the students to the work that corresponding to their education after graduation, which is the goal of all vocational students. Graduation itself is not a sufficiently valuable reason for students for pursuing a profession; obtaining employment makes education valuable to the individual.

This chapter addresses how the Department of Mechanical Engineering of the School of Engineering and Natural Resources of the Oulu University of Applied Sciences (OUAS) has approached educating engineers to better serve and encourage closer cooperation with local companies while helping new engineering professionals obtain their first engineering job. This innovative solution is the annual Mechanical Engineering Pitching Event (MEPE).