

Guest Editorial

In an invited address at Harvard University in 1952, Carl Rogers, the founder of Client centered therapy, applied the principles of his psychology to teaching and learning, summarized in a thesis.¹ He stated: '*I have come to realize that the only learning which significantly influences behavior is self-discovered, self-appropriated learning*'. Realizing, that as soon as you try to teach another person it would be deprived of the chance to find out for him or her self, Rogers '*... lost interest in being a teacher*', and consequently, '*... I am only interested in being a learner.*' The thesis Rogers presented caused quite some turmoil in the audience of educators, who felt their job is threatened. What remains to do for the teacher, when students are directing their own learning? Teachers will have to stop teaching and redirect their efforts towards creating a stimulating learning environment and facilitating the learning process.

This theme issue of the International Journal of Engineering Education focuses on Problem Based Learning. Over the past decades PBL has offered a successful educational approach. Since Don Woods of McMaster University in Canada first coined the words Problem Based Learning, a multitude of educational approaches have emerged applying PBL principles. In all PBL-varieties self-directed learning processes by the students are one of the foremost characteristics. As evidence shows in the above quotations, this feature could very well explain the success of PBL. Because students are actively involved in deciding on their own learning process, they experience the learning as more useful and engaging than traditional teaching.

This theme issue contains a total of 19 papers on PBL in Engineering Education, representing different fields in engineering, and by authors from various countries.

The first four papers represent samples from the state of the art in Research and Development of PBL. De Graaff & Kolmos elaborate on the concepts of Problem-based and project organized learning, providing a framework for further reading. Fruchter & Lewis present a paper on Mentoring models. In an extensive study Abrandt compares applications of PBL in Computer Engineering, Psychology and Physiotherapy. Presenting a well founded example Hansen *et al.* outline the use of a Physical Linear Cascade to Teach Modelling of a System.

Next, there are six papers, each highlighting a spectrum of general aspects of PBL. A case study on Project organized Problem-based learning in Distance Education, is presented by Jensen *et al.* Bender & Longmuss. They look at design projects from the perspective of knowledge management. Cockayne *et al.* discuss a method for assessment of PBL using contextual Skills. The role of central concepts in PBL, like the choice of topics, groups and instructors is being discussed by Acar & Newman. The effect of problem definition is discussed by Jiménez & Farriol. Ekwaro-Osire specifies the teacher role in a design course. The four next papers present specific aspects of the PBL model in engineering. Focusing on freshmen students Inelmen analyses what works and what does not work in PBL. Smith & Janna aim their PBL model on undergraduate engineering education. IP *et al.* present an integrated Problem-based Learning Model for Engineering Education, and Leung discusses the application of Problem-Based Learning in an Engineering Course.

Finally, there are five papers focusing on the application of PBL in specific fields.

Cirstea presents the case of PBL in Microelectronics, Bowe *et al.* highlight PBL and Physics. Ramos & Espinosa describe the application of PBL in the field of robotics and manufacturing systems, Mgangira highlights the impact of PBL on transferable skills. and Alvarado-Lassman *et al* present a model that was used for engineering undergraduate classes in chemistry.

The editors acknowledge the contribution of Rob Cowdroy who advised on some tough reviewing decisions. Putting together this selection of papers was a great learning experience for us. We hope you will enjoy this collection of experiences and views on PBL.

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¹ Carl R. Rogers (1961) On becoming a person. Boston: Houghton Mifflin Comp. p. 276.