Chapter 5

Teaching Creative Problem Solving in Engineering Education

René Victor Valqui Vidal
Technical University of Denmark, Denmark

ABSTRACT

In this chapter, the principles of active learning and the contents of a creativity course entitled: Creativity and Problem Solving, are presented. The main purpose of this course was to create a space for discussing, reflecting and experimenting with creativity, creative processes and creative methods of relevance for university students working with problem-solving approaches. This course was developed at the Technical University of Denmark during the period 1998-2008 for engineering students of various specialities. It started with very few students and developed to a very popular course attracting many students from abroad. The selected themes, the methods and techniques, the structure of the course, the learning processes and the achieved results can be applied to a similar course for university students of other fields such as IT, Management Sciences, System Sciences, Computer Sciences, Design, Agriculture, Business, Art and Education, etc. Finally some reflections, recommendations, and conclusions are also presented.

INTRODUCTION

In recent years, creativity has been widely recognized as vital to success in the emerging global economy. An issue of PeerReview (Wince-Smith D. L., 2006), a publication of the Association of American Colleges and Universities, is entitled The Creativity Imperative and offers a collection of papers acknowledging the importance of creativity in building a competitive workforce and calling for education institutions to play a more active role in teaching creativity to students. In the last decades, many industrialised countries are shifting from an industrial economy to a knowledge economy, an economy based on the production and distribution of knowledge and information, rather than production and distribution of goods. In these economies, knowledge workers are “symbolic analysts” who manipulate symbols rather than machines, and who create conceptual artefacts rather than physical objects. Then the importance of

DOI: 10.4018/978-1-5225-0643-0.ch005
creativity, innovation, and ingenuity is central to the knowledge economy. If the core of the knowledge society is creativity, then the key task for educators is to prepare learners to be capable of participating creatively in an innovation economy (OECD, 2015).

Individual creativity is ubiquitous. New technologies both enable and urge fresh approaches to creativity in the context of education. University-level education offers a natural place to adjust pedagogical structures in favor of an approach to learning that organizes the intellectual community into new patterns of interaction and time allocation. This direction is made possible by the vast improvements in access to information, data, knowledge, and opinion. University students live in this world of access, in an ever-expanding sea of material. Networking second-by-second is central to their zeitgeist. The result is far more than social. Interaction and collaboration are now important in most workplaces, and are expected to be even more important in the future. Higher education needs to use its natural resources in the ways that develop content knowledge and skills in a culture infused at new levels by investigation, cooperation, connection, integration, and synthesis. Creativity is necessary to accomplish this goal. When central and culturally pervasive, creativity becomes exemplified and enhanced for every student. As a technique that can be advanced through practice, problem solving becomes a driving pedagogy in developing creativity in higher education (Vidal, 2009). Universities must meet the challenge of re-appportioning time if suggested changes are to occur. The format of classroom lecture is by nature, not a natural laboratory for interaction and collaboration. Making the curriculum about interpersonal exchange opens the experience for every student to express, share, and test his or her creative instincts. Exchange turns the historical paradigm around and makes the presence of other students and faculty the core attribute of the curriculum and the scheduled classes value added.

The seminal book, *A Whole New Mind* (Pink, 2005), the author makes the point that in the twenty-first-century workplace, collaborative thinking and interacting will be increasingly core. Although jobs will change, diverge, and morph, employers are more and more going to seek workers who are adept at teamwork and capable of contributing original thoughts to group assignments and tasks. As the university’s purpose lies beyond mere career preparation, it is also incumbent on the academy to validate the college diploma as relevant to the future of its graduates. Therefore, the curricula must be intentionally formed around courses, projects, and seminars in which both collaboration and creativity work in consort.

However, today’s educational centres often fail to meet this need. These centres teach students that knowledge is static and complete; the students then become experts at consuming knowledge rather than to create knowledge. The above-mentioned development means that professionals as problem solvers are facing new demands: *skills and abilities of creative problem solving in collaboration with a group of stakeholders (actors, participants, clients and users) related to technological based problematic situations or messes*. Therefore, it is important to teach students specialisation methods and techniques to support and facilitate creative and participative problem solving processes. These creative approaches will complement the traditional understanding of problem solving as a highly rational and programmed process. In addition, problem solvers working creatively and facilitating creative processes experience a constant contact with the pleasure of creation; their work sometimes becomes artistic activities (Vidal, 2004). This will contribute to having a good and enjoyable life. Creative thinking can also become a life style, a personality trait, a way of regarding the world, a way of interacting with others, a way of working in groups, and a way of living and growing. Living creatively means developing one’s talents, tapping one’s unused potentials and becoming what one person is capable of becoming through interaction with other people.