Boxed In: The Lack of Creative Thinking in Engineering Students

Rachel Wilbur
Virginia Commonwealth University

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Boxed In: The Lack of Creative Thinking in Engineering Students

By Rachel Wilbur

Overview
The lack of creativity coming from recently graduated engineering students seems to be apparent through my observations of students, standard social stigma, as well as research conducted at the University of Massachusetts, Dartmouth. However, little is known about the reason behind this vastly growing problem. Without a better understanding of the issues, universities will continue to produce engineers lacking innovative abilities and creative motivation. Seven scholarly articles and studies as well as three primary sources were reviewed and analyzed in order to better understand what difficulties universities face within the engineering community. It has come to my realization that not only is the lack-luster curriculum leading to student disengagement, but the professors also have difficulty expressing the value of creativity, as they cannot clearly define what creativity entails in their specific courses and disciplines. Other problems arise when professors who are proficient with the idea of creative teaching are not incorporating it into their classrooms because the courses are material heavy and time-limited. Several solutions such as project-based introductory courses, interdisciplinary study programs, and professor training have been suggested to solve these faults in the engineering curricula. If changes do not begin to occur within the university environment, engineering students may find it difficult to exhibit the main characteristics of a "good" engineer that companies are searching for—becoming an innovator and a thinker.

Results
Based on a study by Genco (2012) freshman engineering students typically hold more creativity and innovation than those of graduating seniors, but do not lose the feasibility of design. Studies by Ahern (2011), Amoussou (2011), and Haertel (2012) show most professors have a desire to incorporate creativity into their courses but lack the knowledge on how exactly to do so as well as the time. Many classes are content driven leaving little time for the students to explore actual uses for the formulae they learn but rather plug-and-chug. The result is a higher focus on getting good grades than fully understanding the material and knowing how to implement it innovatively. Some universities such as VCU and RPI are attempting to supplement their engineering students with programs such as the da Vinci Center that allows for interdisciplinary open-ended projects. It is the option for open-ended problems that allows students to apply the knowledge from the classroom. Based on the VCU curriculum there is a significant lack of these real-life situations that are presented in engineering course. Most of the problems and projects given to students already have answers. This causes a limit to the creative thinking students can apply.

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Conclusion
Creativity is a necessary part of the engineering curriculum because it allows for improved innovation and discovery. However, the engineering curriculum at most schools is not substantial enough in their ability to teach or encourage creativity. This is leading to graduating students who lack the ability to think creatively and discover innovations. Some of the problem lies in the fact that creativity is difficult to define in the engineering community. There is also a lack of time available to allow for open-ended problem solving, therefore professors opt for the easier, more obvious problems that lack real-life trial and error. In order to correct these issues, we must consider implementing training for professors or additional supplemental programming to allow for creative outlet by the students.

Taylor’s Hierarchy of Creativity
It appears most students reach Technical Creativity by the time they graduate. Liu (2004) suggests it is likely that engineers will not surpass innovative creativity.

References
Taylor's Hierarchy of Creativity
Emergent Creativity
Innovative Creativity
Inventive Creativity
Technical Creativity
Expressive Creativity