Measurement of Engineering Design Creativity in Undergraduate Students

Trina Kershaw  
University of Massachusetts Dartmouth

Molly McCarthy  
University of Massachusetts Dartmouth

Sankha Bhowmick  
University of Massachusetts Dartmouth

Adam Young  
University of Massachusetts Dartmouth

Carolyn Seepersad  
University of Texas at Austin

Paul Williams  
University of Texas at Austin

Katja Hölttä-Otto  
Singapore University of Technology and Design

Abstract: To mold the innovators of the future, engineering schools must educate engineers who can generate creative solutions to design problems. We examined the innovation capabilities of freshman and senior undergraduate engineering students through a concept generation exercise using the 6-3-5 method. Their concepts were scored for originality, and originality was correlated with individual differences such as academic performance (GPA) and engineering design self-efficacy. In contrast to previous results, seniors and freshmen did not differ in originality. Freshman students with low GPA and low self-efficacy produced the lowest originality scores. The creativity of senior students was also assessed longitudinally by comparing their originality on two design problems given across one academic year. An order effect was found: receiving design problem A followed by design problem B led to an increase in originality, while the opposite order showed no change. The results are discussed in relation to practical applications for engineering curricula.