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Undergraduate Student Competitions

Undergraduate students often become involved in engineering or engineering technology competitions. It is often assumed that competitions are strong motivators that help students learn about real world design, which is consistent with the involvement theory of education; however, despite a large amount of effort and resources devoted to student competitions, there was no data on the breadth and range of competitions and what factors help schools win.

This study sought to determine which institutions consistently win competitions, what factors support their winning, and to obtain some insights into the benefits for students. Based on an extensive web survey, forty-four student competitions that had track records were identified, and the first, second, and third place schools from 2001 to 2003 were tabulated. There were 672 winners from 242 different institutions. Only eight schools won more than seven awards during the three year period. The top four schools; Virginia Tech, University of Florida, Cal Poly-San Luis Obispo, and University of Wisconsin-Madison; won a total of 74 awards, which is 11.0 percent. Thus, no school is dominant across the board. This data plus longer term data for three competitions showed that one school would often consistently win a particular competition –for 20 years in one case.

I conducted an e-mail survey of advisors at schools with a consistent record of winning. This non-random sample was selected since advisors at schools that won consistently would be likely to know what factors help teams or individuals be successful in competitions. Based on the advisers' answers, the most important factors that led to their schools winning consistently were the presence of a dedicated faculty advisor and/or the close alignment of the competition with the institution's curriculum. Close alignment with the curriculum appeared to be important when the competition fits within a single discipline (e.g., AIChE and ASHRAE contests). The adviser is often important for contests within a single discipline but appeared to be critically important when the contest cuts across several engineering disciplines (e.g., American Solar Challenge, Human-Powered Submarine Contest and Mini-Baja).

A tradition of winning was also important since it makes recruitment of students easier, helps the team believe they can win, and provides some pressure to not let previous teams down. The quality of the students, which is more related to motivation than high grades, was repeatedly mentioned as important. For hands-on competitions but not for paper competitions, the availability of resources such as a dedicated work space, tools, and start-up funds are important for successful teams.

The advisors provided anecdotal evidence that students learn practical aspects of engineering that they do not learn elsewhere in school. Competitions appear to increase the motivation and hence the time on task of the students in the middle – slackers remain slackers and over-achievers will work hard regardless. Since this is anecdotal evidence, additional research that directly studies student learning is needed.

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Author 1: Phillip Wankat email: wankat@ecn.purdue.edu

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