

Activities that Help Students Maintain and Develop Interest in Engineering During the First Year of College: A Collaborative Sharing and Brainstorming Activity

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Workshop - Activities That Help Students Maintain and Develop Interest in Engineering during the First Year of College: A Collaborative Sharing and Brainstorming Activity

Introduction

According to Merriam-Webster Online Dictionary, *interest* can be defined as “a feeling of wanting to learn more about something or to be involved in something; a quality that attracts your attention and makes you want to learn more about something or to be involved in something. [1] “ Multiple organizations, including federal agencies, universities, companies and scouting organizations, are dedicating efforts and money to increase K-12 students’ interest in engineering, as well as science, technology and math. They are doing this with hopes of persuading more students to pursue a career path related to the STEM (science, technology, engineering, and math) fields. The efforts of these organizations are well supported by theoretical models [2],[3] and empirical studies [4-6] discussed later in this paper, that show interest plays an important role in students’ college major and career choices.

Studies also support that interest plays a role in a student’s decision to persist in engineering [7],[8]; this makes it important for engineering colleges to purposefully attempt to help students retain interest in engineering. Three main opportunities are present in post-secondary education to help students maintain interest: courses and guest lectures, work (co-op, internships and student research) and student organizations. All three of these activities provide students with opportunities to engage with engineering topics, while also increasing their social capital by interacting with others in, or interested in, an engineering field.

Although faculty have some control over student organizations, the area they can help the most students maintain their interest in engineering is in the courses they teach. For multiple reasons this is particularly important during the first year. First, the majority of first year students have not had an opportunity to work or do research in an engineering-related field. Second, during the first year, students are often taking core courses, such as calculus, chemistry and physics, which many students find challenging. Poor performance in the first year could have an effect on their career self-efficacy and have an adverse impact on their interest in engineering [9].

The rest of this extended abstract summarizes theories and empirical studies relating interest to career and college major choice. This will lay a foundation of the importance of interest and will be a starting point in the FYEE workshop where faculty will share ideas on how they currently try to help students maintain interest and brainstorm new ideas to try in the future.

Theories for Career and College Major Choice that Include Interest

Within the research disciplines of career choice and college retention, multiple frameworks have been used to understand why people make college major or career choices, and why they make decisions to persist in the chosen path or change their initial decisions. Some of these frameworks have interest as a foundation. For example, Holland’s theory of vocational choice was built on the premise that personality and interests are more important than aptitude and intelligence when individuals select a career [2].

The step-out to stars framework [10], a result of a study of first year engineering retention, also has interest as a foundation. The framework consists of four quadrants based on interest level compared to another discipline (high = more interested in engineering than another major, low = equally or more interested in something other than engineering) and first semesters GPA (low = below average, high = above average). Ninety-four percent of the students with high interest and high GPA (stars) were retained after one year compared to 67% of the students with low interest and high GPA (searchers), 29% of the students with high interest and low GPA (strugglers), and 21% of the students with low interest and low GPA (step-outs).

Other frameworks use interest as a measure of a factor. For example, interest can be used as a measure of value when using the expectancy value theory. According to Eccles & Wigfield [3], value is related to the incentive or gain from doing or completing a task. They consider four components that determine the value of completing a task as intrinsic, utility, attainment, and cost (note: more recent work has considered cost its own factor [12]). Intrinsic value is related to the enjoyment a person gets from engaging in the task and is related to interest. The more interested one is in the task, the higher the intrinsic value.

Empirical Studies Using Interest

Interest in engineering can be found in studies focused on why students choose engineering as a college major. The results of these studies are dependent upon the way questions were asked, the format of the questions (multiple choice, open response, select all that apply, rank the answers, etc.) and the options supplied. In a multiple year study at the University of Louisville, students were asked for the top three of nine factors they considered when picking a career. *Interest* and *job availability* were the top two picked each year, followed by *a good salary* [4]. In a study at Arizona State University where students were asked to rank in order seven reasons they choose engineering, these same three factors were at the top of the rankings. Seventy-two percent included *Interesting work* in their top three responses [5]. In a longitudinal study of only female students from 53 institutions ($n = 9,071$), the top category of responses in an open response question was *Future job characteristics* (68%) the second highest was *Interest in engineering content process* (58%) [11].

Lack of interest can be found in studies of why students left engineering. For example, in the well referenced study by Seymore and Hewitt [7] 19.8% of the students who left science, engineering and math cited they left due to *lack of interest*. In a study of engineering students who left engineering at the University of Pittsburgh, 72% selected reported *Lost interest/developed new interest* as a factor in their decision to leave engineering. Additionally, 66% selected *Came to dislike engineering/studying engineering*. This compared to 25% who cited *Academic problems* [8]. In the previously mentioned study of female students [11], 54% of the students (out of 839) indicated *Lack of interest* as a reason for leaving engineering.

Conclusion

Theories as well as empirical studies indicate the importance of interest in career and college major choice and persistence. Organizations are working hard to increase interest in engineering in K-12 students in hopes of persuading them to peruse a degree and a career in an engineering

field. Engineering colleges need to be doing their part to help students maintain interest in engineering.

During this interactive workshop attendees will discuss why they are interested in engineering and their preconceived ideas of what engineering students find interesting. Groups will then discuss current efforts they are making to help maintain interest and brainstorm new ideas to implement.

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