GIFTS: Lifelong Learning in Perspective – An Activity for Student Understanding of an Engineer's Need to Acquire and Apply New Knowledge

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This Great Ideas for Teaching, and Talking with, Students (GIFTS) paper outlines an activity to bring students to the realization (consistent with ABET criterion 7) that engineers will need to acquire and apply new knowledge throughout their careers [1]. Enhancing motivation to understand and apply methods for lifelong learning is likely to increase the impact of instruction on lifelong learning methods [2]. This activity is delivered in a first-year seminar at Campbell University, but it could be useful anywhere a similar effect is desired. The seminar meets once a week for eighty minutes and has learning outcomes in student success, understanding and planning for engineering careers, and building community in the incoming engineering cohort.

In the activity, students are asked to respond to the prompt 'To what extent does what you know at the end of engineering school dictate your future career?' Students hold up 1-10 fingers to represent 10-100% influence over their future career and opportunities, but clickers or any other response method could be used to best suit class size or other circumstances. Classes typically respond with average values between 50 and 70%, saying that the majority of future career options and opportunities are dictated by knowledge and skills possessed at the time of graduation. The students are then asked 'What year do you plan to retire?" After establishing that their retirement date is some substantial distance into the future, the class and instructor discuss the state of technology an equivalent distance back in time, and the changes that have occurred in technology since that date. Slides with supporting images and information are shown that illustrate some of these changes. It becomes apparent to students that the technology and circumstances of an engineering career are likely to change substantially over the length of a typical career. To close the in-class activity, students again respond to the prompt 'To what extent does what you know at the end of engineering school dictate your future career?' and much lower values (10 to 30%) are typically observed. The class then pivots to a discussion of the importance for engineers of the ability to learn new information as needed, and methods for doing so. After the class students write and peer-review reflections on this topic and make written plans to develop lifelong learning capabilities while earning their undergraduate degree.

The examples and supporting images used at Campbell University cover a range of technologies such as grocery barcode scanners and disposable razors and some notable historical events that students are likely to be familiar with. Computer technologies make powerful examples due to the rapid growth in their performance over time, but examples could be tailored to many fields with careful choices.

The presentation of this activity may be useful to FYEE attendees as motivating students to learn how to learn is frequently an important topic in first-year seminars and other first-years coursework, or first-year academic support environments [3]. This activity is short but highly effective in putting the need to be able to learn new skills into perspective for Engineering students as the scope of technological change across the working lifetime of an engineer becomes clear. A shortened version of the activity will be delivered during the presentation of the paper and all activity materials, which are licensed with Creative Commons, will be made available to conference participants.

References

[1] ABET, “Criteria for Accrediting Engineering Programs, 2022 – 2023.” abet.org https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-engineering-programs-2022-2023/ (accessed July 7th, 2023).

[2] P. Pintrich, P. and B. Schrauben, “Students’ motivational beliefs and their cognitive engagement in classroom academic tasks,” in Student perceptions in the classroom, J. Meece and D. Schunk, Ed. United States: Taylor & Francis, 1992, pp. 149-183.

[3] K. Reid, D. Reeping and E. Spingola, "A Taxonomy for Introduction to Engineering Courses," International Journal of Engineering Education, vol. 34, pp. 2-19.