BOARD # 280: NSF IUSE: Improving Students' Confidence in Choosing an Engineering Pathway

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The choice of academic major is a critical juncture in a student's academic and professional journey, however, this selection is frequently made uninformed and under uncertainty, leading to some declared major students having an increased risk of attrition when compared to undecided students[1]. A major decision is often a multifaceted and intricate process that is heavily influenced by different behavioral, sociological, and economic factors such as personal interests, familial background, and financial considerations [1,2]. Despite these findings, a gap remains to explore the reasons behind undergraduate engineering students' choice of a particular engineering major.

To address this topic, this NSF IUSE Level 1 funded project aims to better understand the decision-making process of engineering students when selecting their academic major across two large public land-grant universities. The study utilizes an intervention of an online major exploration tool followed by a questionnaire to collect quantitative and qualitative data.

We have previously reported on the development of our survey and interview results [3,4]. The results and understandings obtained from previous published results were used as the basis for designing a new major exploration tool. The online major exploration tool was made available to students enrolled in ENG 100: Introduction to Engineering on both campuses in their first semester. After using the tool, students were provided a questionnaire to provide feedback and insights on the tool. The survey contained Likert-style questions about the accuracy of the tool in deciding a major, the usefulness of the tool, level of confidence in their major, and satisfaction as well as several open-ended questions that asked about their impressions in more detail. The COMPASS tool went to over 2,000 students but only 327 students consented and completed the entire survey. These 327 respondents were used as the sample size. The distribution of majors in the respondent population was 43 from Biomedical Engineering, 4 from Chemical Engineering, 1 from Civil Engineering, 84 from Computer Engineering, 80 from Computer Science, 54 from Electrical Engineering, and 61 from the Mechanical and Industrial Engineering Department.

Results from the post-COMPASS survey indicated that 80% of students were satisfied with the majors that the tool presented as a match and 50% said that they felt more confident in their major choice as a result of using the tool. Open-ended feedback was analyzed and grouped into themes. Users find the system's recommendations to be accurate and helpful, especially in guiding those who are undecided about their major. Additionally, users value the comprehensive nature of the information provided, covering various aspects of each major, including coursework, job prospects, and salary data.

> "I did not know much about the engineering majors other than computer science, so it was nice to learn a bit about what they do."

Students were also asked to comment about what was unique about the COMPASS tool compared to other major decision-making tools. Users found value in being able to explore and compare different majors side by side. They appreciated the ability to see information about professors, alumni, required courses, and other aspects of each major in one place.

> “I like that I can compare two different majors.”
> “Previously, I had not considered the variation in the minimum number of courses per major.”

Some users mentioned that they were surprised by certain pieces of information, such as the salary differences between majors, job availability, or the types of jobs associated with specific majors. These insights helped them reconsider their perceptions and make more informed decisions.

> “I hadn't really put thought of the certain abilities that come into play when taking a job in engineering, but I'm glad it has now been brought to my attention. If two students are offered the same job, and both are at an equal skill level academically, then it comes down to their abilities that exceed that academic skill, such as how good they are at talking to clients or whether or not they have the ability to pick up on certain cues, or how good their problem-solving skills are.”

The findings will allow us to better understand students’ considerations as they go through the critical process of choosing an academic major and allow us to further refine the COMPASS tool. The COMPASS tool is currently in use for first-year students on two campuses and is available in Spanish and English.

Acknowledgement
This material is based upon work supported by the National Science Foundation under Grant No. 2215447.

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