The Accidental Engineer

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There is evidence that the key hurdle to graduating more US engineering students is recruitment, not retention. Ohland et al. show that while engineering retains to the 8th semester nearly 60% of the students who begin in engineering, only 7% of first-time-in-college students who are in engineering in their 8th semester of enrollment began their college careers outside engineering.[1] Many programs have been put in place to recruit students into engineering from underrepresented groups,[2,3] but fewer programs exist to recruit from among students already enrolled in universities and the nature of the engineering curriculum makes it difficult for many students to switch into engineering once they have chosen a different academic pathway.

Most people who apply to colleges of engineering "always wanted" to be engineers or at least they had decided by the time they were seniors in high school that engineering was going to be their career path. Many identify as being "good at math and science" and therefore engineering made sense to them.[4] Others like to build things or got involved in Lego Robotics or similar clubs that inspired them to be engineers.[5,6] However, Kazmer argues that the choice of an engineering major may not be well informed. In a single institution study, he found that while 85% of entering engineering students declared a major at the time they entered the institution, only 21% indicated that they were "sure" of that decision.[7]

In this paper, we explore the motivations and experiences of people who came to engineering by happenstance through exposure to engineers and engineering once they were accepted to or in college and after having decided to major in something else. Their stories may prove instructive as the engineering colleges seek to diversify and invite more people into their majors. Using the Multiple Institution Database for Investigating Engineering Longitudinal Development (MIDFIELD) to provide context, we present information about students who graduated in engineering but began their college careers in a non-engineering major. We then present the stories of six students majoring in engineering who entered college expecting to major and graduate in something else. We conclude with some ideas about how these stories can be applied in colleges of engineering seeking to diversify by recruiting from the population of students already on campus.

MIDFIELD data

MIDFIELD is not only a database, but a long-lasting, diverse partnership among researchers and data providers. The Multiple Institution Database for Investigating Engineering Longitudinal Development contains student record data from 1988 through 2010 for 11 MIDFIELD partner schools, though not all schools provided data in all years. Using the most current MIDFIELD data (which includes more recent data than reported in Ohland et al.'s paper), we find that among those who graduated in engineering, more than 10% began in a non-engineering discipline. Of the over 7000 people who graduated in engineering but began in some other discipline, almost 40% came from other science and math disciplines, which is unsurprising since many of the prerequisite courses in those disciplines are the same as for engineering, making the transition easier with fewer excess credits.

Those who come from other science and math disciplines are more likely to be female (28%) than those who started in engineering (20%). They are also more likely to be Asian. By most entering academic measures (e.g., SAT, high school GPA), they are equally qualified. Figure 1 shows the race and gender breakdown of engineering graduates who started in engineering and selected science and math feeder disciplines.

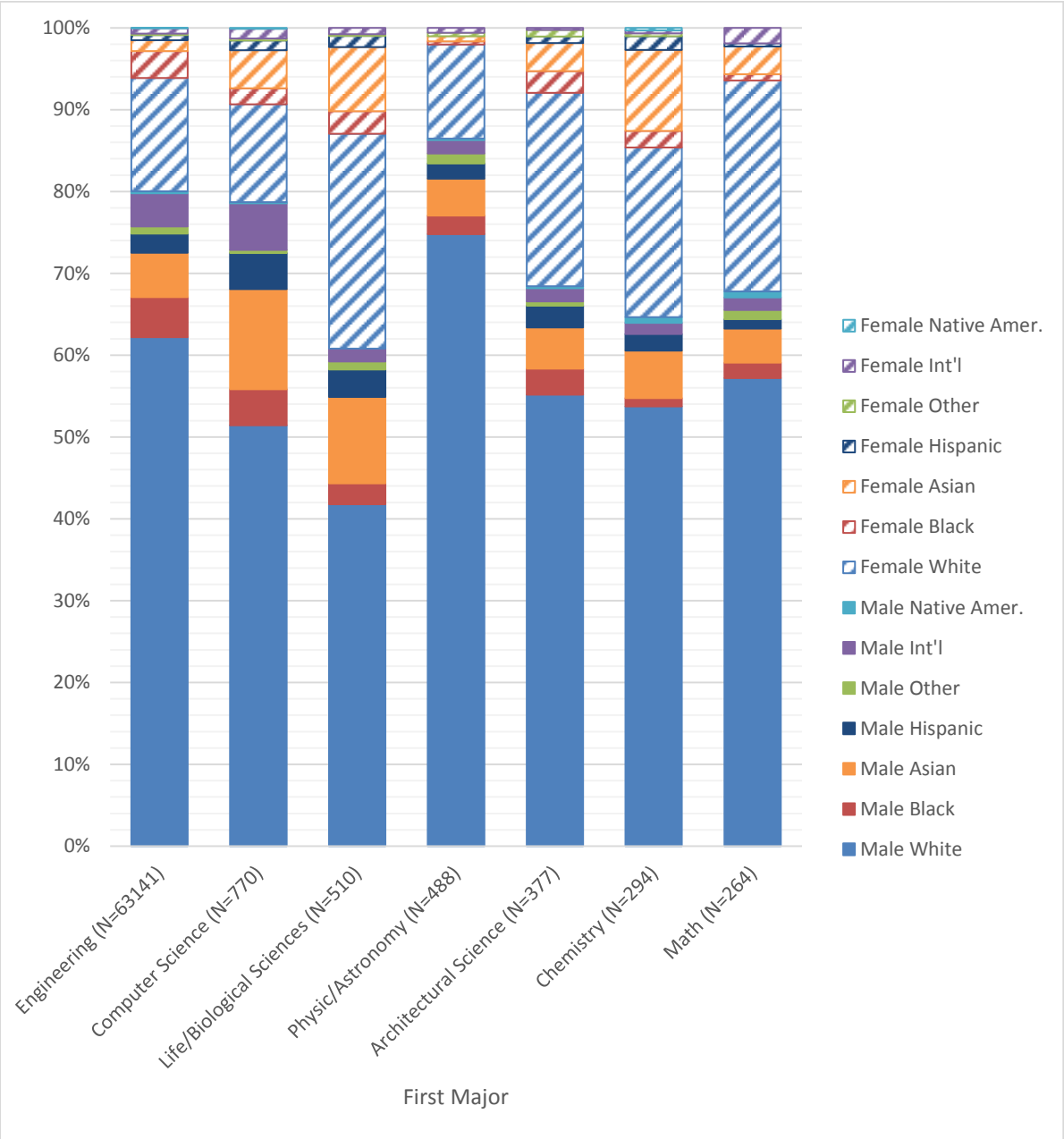

Figure 1 – Race and Gender of Engineering Graduates by Initial Major

Qualitative Methods

In an ongoing study of engineering matriculation practices using MIDFIELD, interviews were conducted with sophomore engineering students at 6 universities in the MIDFIELD partnership.

Prospective interviewees were restricted to those officially majoring in civil, chemical, computer, electrical, industrial, and mechanical engineering as well as those who were still officially in a First Year Engineering (FYE) program or who were in an engineering undecided or unmatriculated category. Among the 61 students who completed the interviews were five who entered their institutions intending to major in something other than engineering.

Concurrent to the interviews with sophomores, interviews were conducted with 86 transfer students in engineering at five of the same six MIDFIELD institutions, and restricted to the same majors. The transfer students were interviewed as part of an ongoing study of transfer behavior and motivation in engineering. Among those 86 was one student who entered his initial institution with no intent to transfer at all or into engineering at the MIDFIELD school (the other 85 chose the transfer pathway purposefully). All students who completed the interviews were given $20 for their participation.

This paper uses a collective case study methodology to explore the motivations of those students we define as "accidental engineers," those who began their studies in a non-engineering major and subsequently switched to an engineering major. The collective case study is an "instrumental study extended to several cases which…may not be known in advance to manifest the common characteristic,"[8] in this case being accidental engineers. Quotations have been modified to improve readability by deleting verbal crutches, such as "um" and "you know" and false starts, and edited for clarity. We have assigned pseudonyms to the students, advisors, MIDFIELD schools (A-State, B-State, C-State, D-State), and programs to protect student confidentiality.

Student Stories

Among the six students we have identified as accidental engineers, all came from other science disciplines. Four applied to or entered college considering a pre-med or pre-pharmacy track and chose their majors accordingly; the fifth changed from zoology; and the sixth came from physics after initially majoring in accounting. Consistent with MIDFIELD data that switchers into engineering are more likely to be Asian, three of these students are. A few are struggling academically while others are doing well. All of them are seeking the right fit, whether inside or outside of engineering. Each of their stories will be shared in turn below.

The Real Accidental Engineer

As soon as Bethany arrived for her interview, her bubbly personality was evident. She was perfectly made up and wore jewelry and perfume making an immediate impression that was different from that of most of the dozens of other women we have interviewed over the years through the MIDFIELD project. It is her story that begat the title of "Accidental Engineer."

Bethany is a white woman who comes from a family where neither parent attended college. Her career plan was to be a doctor and she applied to A-State with that in mind. She was accepted into a program, Diamonds in the Rough, for students who the college of engineering believes have potential that may not be demonstrated by grades or test scores.

I: And, what made you decide to come into engineering in the first place? Instead of say, majoring in chemistry?

B: *I don't know how this is going to impact this study at all,* ***but I didn't mean to apply to the engineering school****. It sounds like one of those weird types of things, but I planned on applying to Arts and Science and I must've been careless when I clicked the button because I didn't really even know what engineering was. ... I was always good at math and most science-based classes. And so, the whole reason I even gave Diamonds in the Rough a chance, which I almost didn't, I thought, "Well, it doesn't matter. I'm going to be a doctor, I don't need to get into engineering." All of my teachers in high school told me that if I wanted to be a doctor engineering wasn't the right path. So it took a lot of convincing and when I came to the information session I thought, "Oh my gosh, you can do all these things. Engineering is not just math and science nerds." And then the first year I decided, I'll give it a chance since I got into the program and it was kind of exclusive. So, I was excited. And then after my first year I was so gung-ho for engineering that I was so blessed to get into the program, just really excited.*

I: And all because you clicked the wrong button?

B: *Yeah, and I know it's a weird thing to say. But yeah, it's all because I clicked the wrong button.*

The college uses Diamonds in the Rough as a mechanism for diversifying its student body as these students with untapped potential have been more likely to be female, minority, and/or first generation in their families to attend college. Bethany describes how her situation may have led to her being selected:

> *I had family issues and financial problems so I spent most of my last half of high school supporting my family. And so it didn't let me concentrate on school as much as I had my first two years. And so it didn't make sense [to be admitted to engineering] because some of my grades weren't there, but my ACT scores were up there, so they were just curious, and probably my essay had a lot to do with it too.*

One of the required Diamonds in the Rough classes introduced her to nanotechnology and she noted:

> *I just realized I didn't really give other things a chance. I didn't even know about nanotechnology. I didn't even know about the fuel industry. And so now I know more about these things and I'm more interested in those than I was in medicine. And so it was kind of a shock because I wanted to be a doctor my whole life.*

We do not know if she might have learned more about engineering in high school if she had put more of her attention there, but neither her high school nor her parents exposed her to the potential career paths available in engineering. Her high school teachers apparently actively discouraged majoring in engineering. Now exposed to engineering, even though it was completely by accident, she has become excited about her future as a chemical and biological engineer. The outreach from the school, by accepting her into the program, exposing her early and regularly to engineering, and placing her in a living/learning community with other

Diamonds in the Rough participants, honors students, and on-site faculty all contributed to the community building around engineering that has made her a champion for the program and the major.

Pre-Med Isn't For Me

Lily is an Asian woman who intended to major in biology as part of a pre-med program of study. She wanted to be a doctor because her "*end goal was essentially just helping people*" and thought that by being a doctor, she could affect many people. She was disappointed in the biology major and rethought her decision to pursue medicine.

> I: So was there anything about biology that made you want to leave?
> L: *I think I realized how limiting it was. Because I felt kind of unsure about med school, and everyone always said, if you're unsure about it don't do it, because it's not for everyone, and there's so many other things you can do with your life that if you want to make an impact there's so many things you can do. And, then I realized with biology, if I don't go to med school my only other options are teaching and research. And I'm pretty sure I don't want to do research, and I don't know if I'm cut out for teaching. So, I realized how limiting it was and I just knew that I wasn't going to follow that path.*

The first two biology courses also contributed to her deciding to change majors because she felt they required too much memorization and less conceptual understanding than chemistry or physics. Her unhappiness in biology led her to explore other majors and she ended up choosing industrial engineering. Her self-reported GPA was in the B/B+ range and having taken most engineering prerequisite math and science courses in her first year as a biology major, she was academically prepared to switch into an engineering major without difficulty.

Because B-State has a very large and well regarded industrial engineering program, she had a lot of friends who were industrial engineering majors and heard from them about the courses she would be taking. What attracted her most to IE though was the "broadness" of the major and how it fit in with her skills and interests.

> *I can theoretically still go to medical [school] if I wanted to, or I can go to law school, or I can go to business school. So, I can do so many things with it and I appreciate that because I'm still essentially just trying to figure it out. And, I have the fluidity to do that with an industrial engineering major.*
> …
> *I really love to think about things in the most economic way as possible. And that's essentially what industrial engineering majors do; they take something and they make it affordable or they make it efficient. I feel like that's something I could do, managing wise and engineering wise.*

The breadth of the industrial engineering field and a desire to make processes more efficient are reasons that many industrial engineering majors cite for why they chose that major.[9,10,11]

The Uncommitted and Floundering Accidental Engineer #1

JaVon is a Black male who entered B-State as a biology major hoping to be able to do research that could lead to a cure for his mother's illness. After a semester in the biology track, he decided that biology did not suit him and went in search of another major. Echoing Lily's sentiments about the introductory biology classes, he said "*I liked biology in general, but just the class was not for me*."

His search for another major also led him to industrial engineering, but without any real commitment to it. He was able to switch majors without meeting any prerequisite requirements for the college of engineering due to a "one free major change" policy at the university.

I: What made you choose industrial?

J: *It wasn't a specific reason, like from that whole group it wasn't because I liked it or something, right now it's just something to try. It's not really because of it. Right now I'm just trying to see how it goes. So I'm just thinking once I start taking – I'm planning on taking like the major classes starting – I was going to do this semester, I just couldn't get in because there was prerequisites and I didn't have it, so I plan on taking them next semester and see if I like those classes. And, if I do then you know I'm going to stick with it. And also I plan on doing an internship with [the] industrial department. So, I'm going to see how that goes.*

His research into alternate majors included talking to other students who led him to conclude *"[IE] was a pretty, I don't want to say easy, but out of what's here, and you know out of all the other engineering, it's a simpler one. So yeah. I think that was my reason to go with it."* That industrial engineering is perceived as an easy major, particularly by students majoring in other engineering disciplines, has been found elsewhere.[11]

Financial concerns weigh heavily on JaVon. He commutes rather than living on or near campus, which is relatively uncommon for students at B-State. He also talked to an industrial engineering advisor about job prospects *"I just asked them how long it takes to graduate or work, to get through. And he told me you can do four years and an internship and land a job. So that sounds pretty attractive to me."* While this may be true for a typical student, JaVon's self-reported academic history indicates that this advice may have been inappropriate. At the time of the interview, JaVon was a first semester sophomore. His grade point average was in the C/C+ range; he had not yet taken Calculus II, planning to do so the following semester. He was not aware of the degree requirements for industrial engineering and did not appear to have an academic plan for himself.

I: Do you plan to graduate in industrial? You don't sound completely sure.

J: *I'm not sure. But, I'm really hoping that I can stick to this. You know, just graduate in industrial*.

I: And, what's your backup plan?

J: *I don't think I have a backup plan like that. My backup plan is to bring a force to the first plan and do whatever I have to do to graduate. So, I mean there's not much of a backup*.

JaVon felt pressure from his family to go to college and financial pressures may have caused him to look for an "easy major" where he could make a lot of money. But he did not sound like someone who was going to be successful. Commitment to a major is an important factor in completion[12],[13] and this student was still struggling to find his place.

The Uncommitted and Floundering Accidental Engineer #2

Victor is an Asian male who came to B-State from out of state. He had accepted admission at another school, but instead chose B-State because of the networking opportunities he had heard about. He entered as a biochemistry major with the intent to go to medical school or pharmacy school after graduating but switched to chemical engineering because in his first semester

> *I got an internship with [a consumer products company]. And then I had a mentor and that mentor told me that it'd be better if I switched over to chemical engineering because if I switched over there'd be more opportunities for me. And then, moving on into their ranks within the company would be quicker and easier - the management levels.*

In addition to the advice he received about switching majors from the mentor, he also considered the job prospects as a biochemistry major should he decide not to go to med school.

> *I was afraid that what if I was a biochemistry major and I ended up not wanting to go to the pre-medical school or pre-pharmacy school then I couldn't really get a job with a biochemistry major unless I'd go into like undergraduate research, or graduate research.*

As they were for Lily, job prospects with a bachelor's degree were important factors in Victor's decision to switch. He noted that with a chemical engineering degree he could work not only at the consumer products company, but also in the oil business. The decision to switch into engineering was also affected by the fact that B-State is "*a big engineering school. If I'm here doing biochemistry, especially I'm out of state so I'm paying a heavy tuition already, I might as well just go for engineering.*"

Like JaVon, Victor's commitment to the engineering major is not strong, which may be related to his academic performance in the first chemical engineering course, which he was retaking at the time of the interview.

> *But back to your question about like if I plan on doing chemical engineering. I'm not definite. I know I said yes, [and] right now I plan on it, but if later on since this is the Intro class, I don't know how long I can really last with the other chemical engineering classes. And if I feel like all the engineering classes, the rest of the engineering classes are not suited for me, I would probably go back into biochemistry.*

His lack of commitment may also be related to his experience with the chemical engineering advisor whom he consulted when he had questions.

Well it just felt like he didn't really want to talk to any students unless you had scheduled a meeting. But, even though his door was still open for you to go in and ask questions, he would just give you a brief answer and then essentially, not ask you to leave, but he would kind of imply it, like not give eye contact to you, and start doing his own work.

This experience kept Victor from visiting the advisor more often, even though he was struggling a bit academically because "*I didn't feel like I would accomplish anything anyways*." He compared the advising in chemical engineering to his experience in biochemistry:

I honestly like prefer the biochemistry advisors because they're more willing to talk to you. They're more open and they'll give you actual advising, write down your whole schedule. Like your four-year plan about what classes to take and what they recommend at a certain time. And, I wish, of course, that he [the chemical engineering advisor] had done that as well. And then, I guess, schedule more time for more students.

Because of both poor advising and academic struggles, Victor seems to have one foot out the door of chemical engineering and back into biochemistry.

Living and Learning about Engineering

When applying to colleges, Felicia, a Hispanic female, considered majoring in criminology, zoology, or engineering. She considered and dismissed engineering while in high school "*Because I always liked math, and I always liked roller coasters and I wanted to design them. And then I just thought that it was too hard with everything going on in the world, and that wasn't really a priority. So I switched*." Coming into C-State, she had made a commitment to the zoology major and fully intended to follow that pathway. Her living situation in the first year was the key factor encouraging her to switch. She ended up living in the engineering dorm with a roommate who was an environmental engineer because "*there weren't that many options when I went to choose housing*" and "*the location was great*."

I: Do you think that being there helped you choose to be an engineer at all?

F: *Yeah, definitely. Our RA was environmental engineering and then our peer mentor was also environmental engineering. And the people that we became friends with were environmental, or industrial, or mechanical. So, I knew that it was definitely interesting, what they were doing seemed interesting compared to what I was doing with zoology*.

I: So you just kind of lucked into engineering because you happened to randomly choose the only dorm left?

F: *Yes, kind of.*

…

I: Do you think you'd be an engineer today if you'd lived in some random other residence hall?

F: *I don't know. Honestly probably not. Because I wouldn't have had the roommate that I had and she said, "Yeah, you should switch to engineering." and I said, "Okay." I like math. So it works.*

Once she was convinced to switch to engineering, the mechanical engineering advisor was very supportive of the decision and made it easy to switch: "*when I went and spoke to the advisor in the mechanical engineering building, she said, 'Okay, you want to switch? Let's do it now.' There wasn't any hesitation whatsoever, and she was helpful. So I didn't double think it.*"

The welcoming environment of the dormitory and the inviting ME advisor were instrumental in Felicia's decision to switch. By making personal connections with other engineers through the living community, she developed the informal relationships that helped her integrate into the engineering community. By knowing other women engineers and what kinds of courses they were taking, she discovered that engineering was more interesting to her than zoology.

A Transfer Student Takes the Long Road to Civil Engineering

Mike is a self-described Navy brat of mixed race who identifies as Asian. He began his academic career at Southeast D-State because his sister was there and it was close to the beach. He started out as an accounting major "*because my sister is an accountant, my uncle's also an accountant, and my mom used to be a bank teller*." But he said he hated accounting after one semester and spent another semester taking general education requirements before settling on a physics major. He describes his pathway to civil engineering at D-State:

> *So I decided to look around, and the one [major] that caught my eye was physics. After one full year of physics, I thought, what am I gonna do with it? I really don't like teaching, and I'm not so great with research because I get tired and bored of it. … So then I found my advisor back in SouthEast D-State, Dr. Schwartz, and he was [the] engineering [advisor] and I decided to go with engineering. At first I wanted mechanical, because I was thinking, "oh, I like how things move together and how machines worked." So then after taking statics, and a few of the co-reqs, or pre-reqs, I decided to transfer to D-State. … [My] overall transfer GPA was a little bit low, because I had to retake statics. And they [mechanical] just said no. So then my advisor [Dr. Schwartz] told me to go apply to somewhere else where they didn't require such a high GPA. So I did that through nuclear. Because I was thinking "my dad was in the Navy," and I was thinking I could work on submarines. I took the first few days of nuclear. Didn't like it as much as I thought I would. So I just decided to keep on taking mechanical courses thinking that I would switch over to mechanical. After the first full year here at D-State, I decided – well, that and the GPA requirements to get into mechanical, said that, no, there's nothing I can really do right now to get into mechanical. So I decided to go with civil, because I kinda still like cars, and I was thinking, oh well, transportation. That's actually really good for things working together to actually save lives. So I decided to do that, and then I took my first transportation course and, yes, for sure I wanna stay with transportation.*

D-State has a 2+2 engineering program at Southeast D-State that includes the on-site advisor, Dr. Schwartz, who instructs introductory engineering classes, as well as distance education classes from D-State for early engineering courses. He knew Dr. Schwartz because his office was in the physics building. One day Mike decided to walk in and talk to him about transferring into engineering which eventually took him to D-State.

Mike arrived at D-State as a nuclear engineer intent on making the best of it, in spite of preferring a mechanical engineering major, but the introductory nuclear engineering course dissuaded him quickly. As he said, he continued to take classes in an effort to switch to mechanical. Advising from mechanical engineering, because it was straightforward and did not provide false hope, helped him eventually choose the path to civil.

I: Did she [the ME advisor] help you figure out what your path out of nuclear was going to be?
M: *Um… yes. And just which courses to take to get into mechanical. And then after that she also looked at my GPA and decided – or she told me upfront, find something else or stay with nuclear.*
I: And so did she help you find civil?
M: *Um [small sigh], no. I think I was talking around and I looked at all of the other engineering courses. And I saw civil and I saw that there was a lot of equivalencies so that I could just keep going with the course and not really pay attention to co-reqs. Because I've already taken the co-reqs and pre-reqs*.
I: So you went to civil because many of the courses that you had taken would apply in civil?
M: *Yes. Yes*.

When reflecting on the transfer experience, Mike noted that he had been admitted to D-State as a freshman and chose to go to Southeast D-State instead.

I: So what do you think would've been different if you had decided to come here as a freshman?
M: *I probably wouldn't even gone through engineering. I probably would've stayed with accounting, probably. I'm not even sure*.

Mike took a long road to civil engineering, which under a variety of other conditions, he probably would not have. If he had not disliked accounting and switched to physics and if the engineering advisor wasn't located in the physics building and if there wasn't an existing 2+2 engineering program at Southeast D-State with D-State, he likely never would have become an engineering major. Even though he never officially enrolled in the 2+2 program, its presence allowed him to be exposed to engineering and the advising that comes with the program. Frank advising also helped him shift his expectations away from mechanical engineering where he would not be admitted to an academic home that he liked that suited his academic abilities and interests.

Discussion

The sophomore accidental engineers described here attended institutions at which students are able to matriculate directly into an engineering major. That is, none was required to complete the requirements of a first-year engineering program. Although the sample here is small, this may be relevant information. Orr and colleagues discovered that the requirements of first-year engineering programs seemed to discourage transfer students from majoring in engineering and discourage non-transfer students from changing majors into engineering.[14] Some institutions,

including B-State and C-State in this study, have no additional requirements to declare an engineering major other than being admitted to the institution.

Even in this limited number of cases, it seems clear that engineering is attractive as a discipline for which the BS is the first professional degree. People who come to college thinking they want to be doctors soon figure out that the job opportunities are limited compared to engineering if they major in a typical pre-med major (biology, biochemistry, chemistry) and yet never attend medical school. Physics has a similarly limited job market. Lily, Victor, and Mike felt that research, teaching, or graduate school were their only options and found them unappealing. They switched to an engineering major because of the job prospects upon graduation.

Like Lily, some students who choose biology majors do so in hopes of attending medical school in the future. As they take classes, some discover that medical school is not suited to them and realize that career prospects with a bachelor's degree in biology may be limited. From MIDFIELD data we know that students who entered as biology majors but graduate in engineering are similarly qualified with respect to entering academic characteristics but they are much more likely to be women than the population that enters as engineers. Therefore, one diversification strategy for colleges of engineering is to recruit women from among disillusioned biology majors who may have met many of the engineering prerequisites during their first year and have demonstrated academic competence to be admitted to the engineering course of study. This could be a recruiting pitch for people who are good at math and science majors but may want a job right out of college – a strategy advocated by the National Center for Women and Information Technology (NCWIT) for recruiting women into computer science.[15] While recruiting students from physics majors is unlikely to diversify the engineering population, these students are generally qualified and, like the biology majors, should have completed coursework in the first year that is easily transferable to an engineering degree.

A sense of community is important for both attracting and retaining students in engineering.[16] Both Bethany and Felicia were attracted to engineering because of their experiences in the living and learning communities in which they were placed their first years. Bethany decided to accept admission to the Diamonds in the Rough program because of the promise of the living and learning community which she considered "exclusive." This community allowed her to develop relationships with faculty and other students in engineering and ultimately to become engineering's biggest cheerleader. Felicia's experience of living with engineers gave her a new perspective on engineering when she had dismissed it previously and ultimately led her to switch majors. Meyers and colleagues have shown that first year student interactions with upperclass students in their dorms and other situations help integrate them into engineering.[17] Although they do not recommend exposing non-engineers to an engineering through an informal living environment as a recruiting mechanism, it is easy to see how being included in the community can facilitate a decision to switch.

The positive sense of community experienced by Bethany and Felicia can be contrasted with the lack of community experienced by JaVon. As a commuter student on a primarily residential campus, he did not get the benefits that come with belonging to the community and the institution, by its nature, is not set up well to meet these sorts of needs. Anderson-Rowland and

colleagues note that being a minority student and a commuter student are among the characteristics of students most at risk of dropping out.[16]

Tinto argues that advising is best when it is intrusive or required of all students, particularly those in the first year. This advising is even more valuable when it is combined with other elements of the educational process.[18] Both JaVon and Bethany had similar circumstances – financial difficulties and an initial desire to be a doctor. What was different was that Bethany was invited to participate in a program that included a living/learning community, enrichment activities, counseling, advising, seminars, and introduction to engineering courses that helped her learn what engineering was all about and what she could do with an engineering degree – a program that appears to meet all of the positive characteristics recommended by Tinto. In contrast, JaVon was left to explore his major options on his own, relying on peers. When he sought advising, the conclusions he drew appeared to be inappropriate for his situation and indicate that the advisor had perhaps failed to take his specific situation into account.

The students here who had positive advising experiences appear to be likely to graduate in engineering while those with negative experiences show signs of disengaging from engineering or the institution entirely. Felicia was welcomed into mechanical engineering by the advisor at C-State and Mike was advised well at many points along the way. However, Victor felt dismissed by his chemical engineering advisor. For him, the influence of prospective employers was more influential. Walmsley et al. found that internships both help draw students to majors and push students from majors as the interships expose them to various career possibilities.[19] However, such extrinsic influences don't necessarily make Victor committed to the major in the face of difficulty, a fact that could be mitigated through more positive advising from the chemical engineering department.

Conclusion

Many of the students discussed above had never really considered the possibility and benefits of pursuing an engineering degree. Bethany discovered a new passion when she was invited to an engineering program. Lily and JaVon discovered it on their own when they became disillusioned about a degree in biology. Victor was invited by his internship mentor, although he found his academic advisor to be less welcoming. Felicia was invited to engineering by her roommate, and Mike was invited by an advisor who encouraged him to find another pathway to engineering when his GPA kept him from being admitted to his first choice program. Perhaps the best way to diversify and recruit more engineers is to personally invite more students who may not have otherwise considered it. For each of these students, one person is all it took. When is the last time you invited someone to engineering?

Acknowledgement

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