Profiles of Chemical Engineers

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Education:
B.S. - Chemistry, University of Illinois
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Job Description:
Assistant Professor

Advice to Students:
"Get out and interview. They need to think of how they want to apply their curriculum. Do you want to go to grad school? Do you want to go into industry? Do you want to use chemical engineering principles in another entirely different field, which is becoming more common nowadays?"

Video Transcript:
"If an undergraduate knows somebody in the field -- corporate sector, academic sector, or government -- that person could serve as an excellent, formal mentor. How would you -- as an undergraduate -- find one if they didn't live in the neighborhood? One way would be to pursue undergraduate research. Get a more hands-on approach to research in chemical engineering."

Interview:

Collins: My name is Bill Collins, and I'm assistant professor of chemical engineering at Howard University. It's my fourth year, and I really enjoy the job-its research and teaching aspects.

Q: What are some of the behind-the-scenes stuff that you have to deal with, as a professor, that students may not know about?

Collins: A very large part of the responsibilities of any university professor is conducting research. Students don't see very much of this because most of it is done away from the classroom-in my office, in the library. Professors in the physical sciences, like chemical engineering, are required to have supportive research, submit proposals to acquire their support, and direct the research of graduate students. This is a very large part of my

responsibilities as a professor. Also, there are various services. For instance, I'm an adviser to the AIChE Student Chapter here at Howard. I serve on other university-wide, school-wide committees.

Q: What career path have you followed so far?

Collins: As an undergraduate, I was a chemistry major and went to UW-Madison, where I got my M.S. and Ph.D. in chemical engineering. From there, I got a teaching job in a community college, because when I graduated I thought that I would like to teach in the physical sciences as opposed to conduct research. You know how it is-the grass always appears greener on the other side. As a graduate student, I just wanted to teach. Then, when I was teaching, I also wanted to do research. I was interested in Howard University because it provided me with an opportunity to teach minorities in chemical engineering and, thus, contribute to a diversity initiative in the field.

Q: What are some of the challenges and some of the opportunities that minority students and women in chemical engineering face?

Collins: They face a number of challenges. I don't exactly know the reason. I do know that their preparation in mathematics and the fundamentals of science could be better every step along the way. For instance, a high school student who wanted to go into the field should get four years of math and try to get at least three years of physical science. Also, the lack of mentors. This is a very intense field. Mentors can help guide you through this field. Without them, it's a lot of information for one person.

Q: What mentor opportunities might an undergraduate seek out?

Collins: If an undergraduate knows somebody in the field-corporate sector, academic sector, or government-that person could serve as an excellent, formal mentor. How would you-as an undergraduate-find one if they didn't live in the neighborhood? One way would be to pursue undergraduate research. Get a more hands-on approach to research in chemical engineering, as well as seeing some of the stuff done behind-the-scenes.

Q: What courses, extracurricular activities, or other experiences, would you advise a student to pursue?

Collins: Try to get some statistics, because that's going to help them no matter where they go-grad school, industry, or whatever. I'd also want them to have some exposure-or some involvement-in organizational work and industrial work. Our student chapter of AIChE here at Howard has a couple of initiatives each year where it goes out in the community to show children, the youth in the community, what chemical engineers do. This year, we're trying to develop some kind of tutoring program.

Q: What type of research grant-writing process do you go through?

Collins: The way that research is supported is by having proposals funded. Proposals are ideas that we put together and defend. We submit them to various agencies-federal and private-that we think might be interested in supporting this work. These proposals are very important for the welfare of the department and for the field, because this is what fuels the state-of-the-art in the field and causes it to be pushed further. Therefore, one has to keep abreast of one's field by attending symposia and conferences, reading the many journal articles, and just holding brainstorming sessions with colleagues.

Q: What are some of the mistakes that you see chemical engineering students making as they go through their undergraduate years?

Collins: One mistake they make is not getting any industrial experience before they graduate. They need some. It's very plain and simple. Another mistake is not getting any research exposure before they graduate. They might be lucky and kill two birds with one stone and get industrial experience working in an R&D lab. But they can always get undergraduate research experience at their alma mater, and they need to be aggressive about pursuing it.

Q: What are some of the high points and low points that you face every day?

Collins: The major high point of being a university professor is the opportunity to influence and enrich many young people's lives. A low point is that professors are involved in many projects and have many responsibilities. I'm often interrupted-that makes it tough when I have a problem I know is going to take a couple of hours or if I'm trying to get a proposal out or paper written. These interruptions just reflect the fact that I influence many folks and different types of things. So I guess it can also be considered a positive. If you want to go into academia in the field, you need to become accustomed to these kinds of things.

Q: What advice would you offer to someone interested in becoming a university professor?

Collins: As an undergraduate, get some things going while you're still in undergrad school. Find a mentor or mentors at your alma mater. Their mentors have a Ph.D. too. So when you go to grad school, if you don't really find a mentor that you can use, you have a backup plan. Make sure you have some statistics. Statistics help in so many different types of ways. Statistics is another challenging course and students tend to shy away from this course. But it's something that you can use in so many different ways. If you don't have statistics as an undergrad, take it in grad school. You might as well have the benefit of using its principles early on. Finally, though a freshman or sophomore won't take a course in transport phenomenon for another year or two, you need to have that on your transcript because it's very, very important to graduate work in chemical engineering. It's one of the fundamentals in the field.

Q: Is it important for a professor to have some industrial experience?

Collins: I have a little industrial experience. There are a number of chemical engineering professors that have none. Since chemical engineering is so pertinent to the chemical process industries, some contact is near-imperative, because we need to know how we take what we learn and apply it. How we make this large field, the chemical process industries, viable.

Q: What advice would you offer to chemical engineering students to make them the most marketable people at the end of their undergraduate work?

Collins: Get out and interview. They need to think of how they want to apply their curriculum. Do you want to go to grad school? Do you want to go into industry? Do you want to use chemical engineering principles in another entirely different field, which is becoming more common nowadays? Graduate schools have the resources to turn out more chemical engineers, to conduct very exciting research, and to involve studies in that kind of process. Industry gives you a chance to make a product, perfect a product, make a process, perfect a process, and a student needs to make a choice on that kind of basis. Sometimes students don't know what they're choosing when they look at grad school versus industry, and they need to talk to faculty to get a better feel for this.

Q: What type of career options do chemical engineers have?

Collins: Chemical engineers are very well prepared to do most jobs in the chemical sciences, and the chemical process industry is one of America's very largest industries. If you have preparation to do many different jobs in the chemical process industries, that means you have a very diverse career path ahead of you. You're a pretty marketable commodity as a chemical engineer. Chemical engineers do a lot of different things. We make products and we do physical science. My research is more oriented toward physical science. It's more of a basic type of research, and my chemical engineering training is excellent for me to do this type of work.

Q: What type of research do you do?

Collins: My research is an example of the diverse options available to chemical engineers. I conduct research in biomaterials, surface science, and polymer materials science, namely the deformation rheology of polymers -- none of the areas that we consider traditional chemical engineering areas. There's no pumping or distillation, but I'm involved in research that chemical engineers have been involved in-and done outstanding work in-for decades. Chemical engineers have the background to do many different things.