

Promoting excellence & innovation in science and engineering through
research, evaluation & programs to enhance diversity

Future Nanotechnology Workforce?

In the winter quarter of 2006, Professor Kannan Krishnan offered a Materials Science and Engineering course, with a focus on the science and technology of nanostructures. The class was offered to upper division undergraduates and graduate students at the University of Washington. At the end of the quarter, Deborah Bassett, a research assistant for the Center for Workforce Development administered a survey consisting of 15 questions. The survey was voluntary and was designed to evaluate the class, the participants' career goals and their opinions about some of the ethical issues associated with nanotechnology.

WHO ARE THE STUDENTS?

This survey consisted of 12 students. The class was almost equally split between graduate (58.3%) and undergraduate (41.7%) students. Most of the students (83.3%) were between 18 and 26 years old, with 50 percent of the students being between the ages of 18 and 22. These demographics could suggest a current trend in nanotechnology education. Undergraduate and younger graduate students might be more likely to take an introductory class in nanotechnology. This could be due to several factors. Classes in nanotechnology are relatively new, thus older graduate students might not be as exposed or intrigued by the new movement, yet. Additionally, older graduate students may be fixed in their discipline or almost finished with their program and less likely to venture out. However, the results from this survey cannot establish whether the age gap is a trend or coincident.

A trend that has been established, however, is the gross underrepresentation of women and minorities in science and engineering, whether in the labor force or academia. This class was no different. Seventy-five percent of the students were male and 91.7% Asian and whites¹. Despite advances made in the proportion of women and minorities choosing to pursue science and engineering careers, women and minorities continue to be significantly underrepresented. Women comprise only 23 percent of the science and engineering labor force, while ethnic minorities only constitute 7 percent². If the composition of this introductory nanotechnology class can serve as an indicator of future nanotech students and workers, then exploratory research should be conducted to investigate whether or not older students take nanotechnology classes, and if not, how this might contribute to future nanotechnology workforce shortages. Additionally, research should be done to explore how diverse nanotechnology programs are. If diversity is lacking, further research should be done to explore why.

¹ It is unclear whether the Asians are Asian Americans, International students, or both. Fifty percent of the participants were Asian, while 41.7 percent were white.

² National Science Foundation. *The Science and Engineering Workforce: Realizing America's Potential*. Arlington, VA: NSF, 2003.

WHO WAS MOST LIKELY TO BE IN THIS CLASS?

Almost 70 percent of the total students came from chemistry and engineering. After running crosstabs, it is revealed that most of the graduate students (57.1%) were in chemistry. However, 40 percent of undergrads were electrical engineering majors and the rest were engineers³. Why is it that graduate and undergraduate students come from different disciplines? Whether discipline influences whether a student will enroll in a nanotechnology class and how this might be complicated by graduate or undergraduate status needs to be studied in depth. It could also be that the students that took this class had previous exposure to the professor teaching the class, which also might be important in the recruitment and retention of minority students. These are important issues when trying to ensure an adequate supply of an educated and diverse nanotechnology workforce.

WHERE THE STUDENTS WOULD LIKE TO GO

Purportedly, students would sign up for this class because of an interest in nanotechnology. Therefore, their expected career paths are of interest as a small sample of future nanotech educated workers. However, the results do not tell us very much. Seventy-five percent of the respondents were not planning for employment at the time of the survey. It could be that most of the undergraduate and graduate students in this course were not in a place in their academic career to make employment decisions. In other words, most of the students were probably not close to graduating. Of those going into the labor force, 16.7 percent were currently seeking employment, but had not been offered a job. Others (8.3%) had been offered a job, but had not made a decision yet⁴. No one had accepted an offer.

Although not everyone in the survey was looking to going into the labor force right away, they did have an idea of where they would like to work. Almost all of the respondents, 93.4 percent, wanted to work in either government or industry⁵. The remaining 16.7 percent would like to work in academia upon completing their studies⁶. A descriptive analysis of nanotech workforce needs is not available at this time. Once an empirical analysis of nanotech needs is completed, it will be interesting to see if most of the need in the nanotech workforce will be in government or industry.

Since this survey is so small, it is difficult to make any predictions or suggestions. However, as a pilot survey, this study does reveal the importance of studying nanotechnology students. If replicated on a larger scale, surveys like this can tell us who nanotechnology students are, where they come from, and where they would like to go. All of this is important information if the scientific community is going to be prepared to deliver an adequate nanotechnology workforce.

³ The choices for this question were: Chemistry, Materials Science, Electrical Engineering, Engineering and Aeronautical Astronautical Engineering.

⁴ It is unknown what industry these jobs are in.

⁵ The respondents were equally split (41.7% & 41.7%) between the categories.

⁶ No one picked non profit or other.