



Count Me In

RECRUITING AND RETAINING WOMEN AND MINORITIES IN THE IT WORKFORCE

INTERVIEWED BY JIM RAPER

■ *Information technology (IT) was experiencing a troubling workforce trend in 2002. The representation of women and African Americans in IT was on the downswing. The Information Technology Association of America reported that the percentage of women in the overall IT workforce fell from 41 percent in 1996 to 34.9 percent in 2002. For African Americans, the percentage fell from 9.1 percent to 8.2 percent during the same period.* ■ *For women, who made up about 47 percent of the United States workforce at the time, and for African Americans, who made up about 11 percent of the workforce, the figures indicated that they were not getting their share of jobs in this emerging and potentially lucrative field. Furthermore, their prospects were becoming bleaker, not better.* ■ *What was causing this trend? And could anything be done to reverse it?* ■ *These were the questions four faculty members at Old Dominion University set out to answer in 2003 with a National Science Foundation-funded (NSF) project, “Climate for Opportunity and Inclusion: Improving the Recruitment, Retention and Advancement of Women and Minorities in IT.” Co-principal investigators for the grant were three Department of Psychology faculty members — Debra A. Major, professor; Donald D. Davis, associate professor, and Janis V. Sanchez-Hucles, professor — as well as Joan E. Mann, associate professor of information technology and decision sciences in the College of Business and Public Administration.* ■ *They surveyed more than 900 IT professionals from 10 large and small companies across the country; 36 percent of the respondents are women and 30 percent are ethnic minorities.* ■ *Findings of the ODU researchers provided the basis for a short list of rec-*

ommendations that they wrote and shared with executives and managers of the 10 participating companies. The researchers’ bottom line was simple and direct: an IT employer who wants to hire and retain more women and African Americans should take unambiguous action to create a workplace environment that accommodates diversity and promotes equal opportunity. Moreover, supervisors should be trained to create and maintain supportive relationships with those who report to them as well as to create supportive work environments. ■ *The researchers performed “interventions” in the participating workplaces that were measurably successful. The effectiveness of their efforts was not lost on the NSF, which gave the team a follow-up grant to put their ideas to work in university computer science programs both at ODU and at Norfolk State University. Sandra J. DeLoatch, dean of NSU’s School of Science and Technology, joined Davis, Major and Sanchez-Hucles as co-principal investigators of the latest grant, which is titled, “Creating an Inclusive Learning Environment: Enhancing Retention of Women and Minorities in Computer Science,” or INSITE for short.* ■ *Stephen Tonelson, ODU professor of early childhood, speech-pathology and special education, serves as an evaluator on the project.* ■ *In the fall of 2005, the researchers and computer science faculty from ODU and NSU created and implemented an innovative curriculum for beginning computer science majors. One goal of the curriculum is to reduce the number of students, particularly females and minorities, who are “weeded out” of CS by introductory programming courses.* ■ *In the following, Davis, Major, Sanchez-Hucles and DeLoatch answer questions about their work.*



Step I: Counteracting A Sense of “Tokenism”

QUEST: Professor Major, you led the first project concerning recruitment and retention of women and minorities in the information technology workplace. What did you find was suppressing the numbers of women and minorities working in the field? Did women have the same frustrations as minorities?



MAJOR: The underlying premise of our research was that women and minorities may be underrepresented in the IT field because they have more negative work experiences in the IT work environment than white males. When we compared men’s and women’s experiences in the IT work environment, we were surprised to find many similarities. For instance, men and women reported similar levels of belonging, participation, supervisor and co-worker support and job satisfaction. However, women differed from men in three important ways: they reported receiving less fair treatment, having less influence in the work environment, and having less commitment to a career in IT. In part, women’s lower career commitment is explained by the unfairness and lack of influence they experience.

The most important thing we learned with respect to minorities is that there is no single ethnic minority experience in the IT workplace. Members of different ethnic groups have different experiences. For example, members of Asian, Asian Indian, and Hispanic groups generally reported experiences that were at least as positive as the experiences of whites.

African Americans and Native Americans, on the other hand, consistently had more negative experiences than other groups in the IT work environment and were more likely to feel the effects of “tokenism.”

It’s important to note that while we detected general trends for women and members of ethnic minority groups, experiences varied a great deal between companies as well.

Questions



QUEST: Can you expand on the problem of “tokenism” in the IT workplace?

SANCHEZ-HUCLES: We believe that one of the major reasons that ethnic groups may experience the IT workplace differently is that members of certain minority groups are more likely to be “tokens” than members of other minority groups. Though specific definitions of tokenism vary, most definitions focus on the idea of underrepresentation of a minority group in a particular work setting. Members of this token group then must contend with significant restrictions on their access to advantaged positions on the basis of their group membership.

Our research defined token status as a member of a racial group having no other individuals of his or her ethnic group in the work area. We found that African Americans and Native Americans were more likely to be tokens in their work areas and, in accord with the experiences of tokens, they were less likely than Caucasians, Hispanic Americans, and Asian Americans to believe that the work environment provided equal opportunity. It is interesting to note that even though we found a higher number of African Americans in IT than Asian Americans, the African Americans were more likely to be “the only one” in their workgroup and thereby experience token status.

Individuals identified as tokens showed no differences from their co-workers in their overall relationships with supervisors and in receiving specific work-related assistance. However, tokens reported significantly less emotional support from their co-workers and felt less satisfied with the non-work or social aspects of the work environment.

Our results suggest that organizational strategies focused on recruiting and retaining a diverse IT workforce may be more effective if they concentrate on ensuring a “critical mass” of ethnic group members rather than on recruiting and retaining individual members of underrepresented groups. With a critical mass of individuals, we believe that underrepresented groups will be less likely to feel isolated from the social and emotional support of the work environment and may come to view their work environments as more equitable.

QUEST: Did the companies you surveyed seem eager to get your feedback?

MAJOR: Many companies we worked with routinely conduct their own surveys, and they were excited to see outside confirmation of their own findings. Although we cannot identify the companies that participated in our research, several of them are household names and devote extensive resources to creating positive work environments. Other companies had never raised questions about diversity and were interested to learn what their employees thought. All of our interventions began with comprehensive survey feedback and benchmarking information. Companies were able to see how they compared to other companies.

We assisted each partner organization in identifying the most critical areas for improvement. Specific interventions were driven by specific needs. For instance, following our feedback, one organization began having weekly meetings to provide greater opportunities for information sharing and input in an effort to increase the influence of IT professionals. This same organization also made the process for gaining access to training opportunities more public and transparent in an effort to increase fairness. Another organization implemented a telework policy, a technical career path, and a new system for assigning “on-call” time in order to improve fairness and equal access to opportunities.

DAVIS: One of the important scientific contributions of our research with IT organizations is demonstration of the effectiveness of empirically based, organization change practices. We showed how organization data could be used to change organization practices to enhance the work experiences of women and minorities in IT. We continue to use this practice in INSITE.



Step 2: Changing The Classroom Climate

QUEST: Professor Davis, you are the principal investigator for the second grant. Explain how your research segued from the IT workplace to the computer science classroom. Is representation of women and African Americans in CS programs as low as in the IT workforce?



DAVIS: The short answer is yes. In many ways, the computer science classroom mirrors the computer science workplace. We believed that some of the factors we found that were important to satisfaction, commitment and retention in the workplace would be important in educational settings as well. We also realized that differences between the two settings would require us to adapt what we had learned to make it fit in the university. We were eager to extend what we had learned about the workplace so we began to scout for funding to support this research. Also at this time, the National Science Foundation had announced that it was interested in testing implementations of the more fundamental research they had previously funded. So the timing was right—our interests and NSF’s interests converged.

Women and African Americans face the same challenges that all students face in IT, especially computer science. It requires a strong background in mathematics and is hard work. Without intending to do so, however, academic departments in the sciences and engineering, such as computer science, can also create learning environments that make learning more difficult, particularly for women and African Americans. For example, individual performance is emphasized over collaboration, and applications tend to emphasize abstract mathematical or engineering applications, rather than focus on solving real problems or helping others, which tend to be more interesting to women and minority students.

Moreover, as Dr. Sanchez-Hucles noted, women and minorities are often tokens in their department due to their low representation. This can create a sense of disconnection and isolation. This feeling is likely to be amplified when there are too few women and African American faculty members who can serve as role models and provide mentoring. Finally, some departments provide “chilly climates” by excluding those who are different, by expecting little of them, or by making them the target of jokes or hostility. Most of the time, however, the exclusion is more benign, yet still harmful. The failure to actively include others, particularly when they are different, is equivalent to excluding and rejecting them. Of course, if one feels excluded, one is more likely to pursue a different major and career. So when departments use their first few courses to “weed out” students, they are disproportionately likely to weed out students who are different. In the sciences and engineering, women and African Americans tend to be those students who are different.

QUEST: What are some of the main facets of your pilot curriculum?

DAVIS: Our pilot curriculum has two main parts. One part focuses on the manner in which students learn programming. We are testing an innovative approach that reduces isolation and increases collaboration, called “pair programming.” In pair programming, students work together to write and debug programs. Research at other universities and in industry has found that this method increases program quality and satisfaction with the programming experience. Students who have practiced this method report greater commitment to computer science as a major.

The second part of our curriculum includes a class that is required of all new computer science majors. This class provides a realistic preview of work as a computer science professional, with candid discussion of advantages and disadvantages. Role models from industry and the university provide guest lectures and describe the daily work of a computer science professional. Students are also taught how to seek help, deal with stress, seek out role models and mentors, work collaboratively, and deal with difficult professors and classmates. This curriculum is simultaneously being implemented at ODU and Norfolk State.





QUEST: Is it true that if universities can help female students and at-risk minority students get through their first few computer science courses—over the hump, so to speak—they often thrive as juniors and seniors in the program?

DAVIS: Yes, in fact, this is true of all CS students. If all CS students can complete their first three required classes, they are very likely to graduate. At both ODU and NSU, half or more of computer science majors quit their study of CS after taking the first two classes. This dropout rate increases further when the third class is taken. If our project is successful, we expect that all CS majors, not only women and African Americans, will be retained at a higher rate. Because high dropout rates are common in many computer science departments, our results, if positive, should be useful to many departments throughout the country. In fact, as part of our grant, we will convene a national meeting in 2008 that will pull together researchers and employers concerned with this problem around the country, to disseminate all of our findings as broadly as possible.

QUEST: Dean DeLoatch, are there specific innovations of the pilot computer science curriculum that are different for NSU, which is a traditionally African American university, than for ODU?

DELOATCH: There are no distinctions in the curricula at the two institutions that are racially motivated. NSU is piloting the use of laboratory sessions to complement programming lectures for the first time this fall. This practice has been in place at ODU for a number of years. Programming laboratories at NSU are scheduled for one two-hour session per week, while those at ODU meet one hour each week. We allocated more time so that students will have a greater opportunity to “practice” their programming skills.

Another distinction in the innovations is in the use of pair programming. At NSU we will permit students to complete programming assignments with a partner in the laboratory sessions as well as for programming assignments that are completed outside of class time. I believe ODU has elected to use pair programming in laboratory sessions only.

In essence, we are employing innovations that are likely to have a positive impact on the academic performance of minorities and women in computer science. Moreover, we expect these innovations to positively impact all students, regardless of their ethnic backgrounds.



IT Stereotypes Hinder Women's and Minorities' Interest

QUEST: Professor Sanchez-Hucles, you said at a seminar sponsored by your grant that there are cultural and societal expectations that make it harder for young women to get an early start in computer science. Can you elaborate? How can we change these expectations so that females are more comfortable studying and working in the field?



SANCHEZ-HUCLES: There are multiple barriers for women and some ethnic minorities that delay or prohibit their entrance into computer science. Teachers and parents may say that math and science are only for boys, or for Caucasian and Asian individuals. They may imply that certain people are gifted or passionate in these areas of math, science and computers, and that, for everyone else, interest and hard work will never be enough to succeed. The IT field is portrayed as one that supports individualistic working styles and competition, which suits many males but often makes women and minorities uncomfortable, as Dr. Davis mentioned. Recreational and informal computer activities tend to encourage young men more than young women to experience the “fun” of computer science.

Unfortunately, some talented young women and ethnic minorities shy away from the “geek” stereotype. They believe the field is populated by the socially inept. They also are turned off by portrayals of IT as requiring long work hours with little or no accommodation for families.

In addition, many women and ethnic minorities look for career options that they believe to be socially meaningful and will foster opportunities for interaction and collaboration. They believe this is more possible in fields such as medicine or law. Finally, many young women and non-Asian minorities know no one who works in this field. They have no ready access to positive information about IT or to potential mentors.

We should debunk the “geek” stereotype and get the word to young women and ethnic minorities that they do not have to be obsessive about computers or forfeit a social life or family life in order to succeed in computer science. We should begin to recruit underrepresented groups much earlier, such as in elementary school, and build supportive environments so that young women and minorities do not see computer science as a club for white males.

QUEST: What role did computer science faculty members at ODU and NSU have in designing the first-year curriculum you are implementing? What role will these faculty members have in assessing the program you have put into place?

DAVIS: They have been involved in all aspects of the INSITE project. Computer science faculty and members of the research team have met together regularly since the project began in 2004 to learn from one another and shape the planned changes. Computer science faculty members have shaped the manner in which the research team's ideas were adapted to fit the computer science curriculum. They have also influenced creation of the new course and all of the measurement instruments and evaluation procedures. The different professional backgrounds of INSITE participants—psychology, computer science and education—have led to interesting discussions and learning during our working together. We've had to learn about one another's academic worlds. We're still learning this.

INSITE grant participants from the ODU computer science department faculty are Chair Kurt Maly, Janet Brunelle, Jay Morris and Dennis Ray. Participating from the NSU computer science department faculty are Chair George Harrison, Jonathan Graham and Aurelia Williams. Graduate research assistants from ODU are Katherine Selgrade, Shannon Mickey, Heather Downey and Katherine Fodchuk, and from NSU, Nikki Jackson and Winton Jones.

