ABSTRACTS OF 10 PROJECTS – alphabetical by first pi name

EIA-0306012
PI's: Peter Cappelli and Jerry A. Jacobs

Institution: National Bureau of Economic Research (NBER)
Title: The Impact of Information Technology Use on Employee Demography and Employer-Provided Training

This ITWF award provides support to analyze national data on establishments, their characteristics, and the experiences of their employees to examine questions concerning the relationship between information technology (IT) use by employers and employment related outcomes. The project will first analyze the distribution of women and minorities in IT jobs, as classified not only by the tasks employees perform but the IT systems in place at work. It will then explore factors that explain the incidence of women and minorities across IT jobs, including aspects such as career paths (e.g., internal promotions and temp-to-permanent tracks) and how employees are managed. Finally, it will explore how attributes of IT use relate to employer-provided training: Do IT-intensive employers provide more IT training, especially to their IT workers? When they provide IT training, do they offer credentials for it? If so, what accounts for their ability to provide such general training?

The investigators will examine these questions using unique data from the National Employer Surveys of the U.S. Bureau of the Census. These establishment surveys, conducted in 1994, 1997, and 2000, identify important characteristics about employers including their use of IT and their general management practices. The 2000 version also contains a Supplement that surveys employees in these establishments. It identifies IT-related tasks, IT-related training, and demographic attributes of employees such as whether they are women or minorities. These data will be enhanced by information from the Census of Manufacturing Supplement on Information Technology, also conducted in 2000, which has especially good measures of various IT interventions. The data from these different sources will be merged, allowing examination of relationships not only with individual-level IT tasks, such as programming, but also with the use of specific IT systems, such as Enterprise Resource Planning (ERP). The combination of more detailed measures of IT use and information about individual IT workers will allow more careful analysis than ever before of relationships between IT use and employee characteristics and employment outcomes. In particular, rather than classifying workers crudely into "IT" or "Non-IT" jobs (in the past typically based on the employer's product market), the analyses can examine relationships between the extent of IT use and important job outcomes, especially for women and minorities.

EIA-0305216
PI's: Janice Grackin, Joanne Daly and K. Wendy Tang
Institution: SUNY at Stonybrook
Title: Girl Power 21st. Century: Growing Strong, Moving On.

Girl Power 21st Century is a three-year project that addresses the need for early educational intervention to increase the number of women pursuing technical education and careers. The project is designed as a model collaboration between a higher education institution (Stony Brook University), a community organization (Suffolk County Girl Scouts Council), and a local school district (Riverhead School District) with a high proportion of minority and/or lower income families. The current program builds on a successful four-year-old program, *Girl Power: Growing Strong with Technology*, and includes three modules for girls in grades 2 through 8. The current Beginner and Advanced *Girl Power* classes function as Module 1 for second- and third-graders, covering basic computer skills, web-building skills and technical vocabulary.

To bridge the technology education gap that currently exists between third grade and high school for the target population, two new modules have been designed for *Girl Power 21st Century*. Module 2 consists of a one-week Summer Technology Day Camp for fourth grade girls who have completed both classes in Module 1. This experience will provide more challenging technical and programming activities and will bridge into Module 3, Project Options, for girls in grades four through eight. The first phase of Project Options will be the development of an interactive website as a place for girls aged 8-14 to explore career options. In addition to the acquisition of technical skills related to web design, Project Options will provide girls with the opportunity to develop and enhance other skills, such as interviewing, online research, writing, filming, and digital photography. In the second phase of Project Options multiple cohorts of girls will maintain the website by creating new content and new formats, and updating old information. Older girls will become involved in mentoring younger girls and acting as mentors and teachers in the lab.

EIA-0306092
PI's: Paula Kohler and Edward Applegate
Institution: Western Michigan University
Title: Creating Pathways to Information Technology Careers Through High School Career and Technical Education Programs

The *Creating Pathways to IT Careers* Project is a research partnership between Western Michigan University (WMU), the Illinois State Board of Education (ISBE), and a Research-to-Practice Team consisting of business and practitioner stakeholders. In conjunction with the NSF, this collaborative research partnership will determine factors that influence enrollment, completion, and employment experiences of high school females in Career and Technical Education-Information Technology (CTE-IT) programs. Using population data collected by the Illinois State Board of Education regarding enrollment in secondary and postsecondary education and post-school employment, the project will investigate preparation for IT careers in the following areas: (a) counselor and teacher support strategies provided in high schools to recruit and retain students in CTE-IT programs; (b) student and school characteristics that

influence CTE-IT program enrollment, school-directed work experience, and program completion; and (c) the influence of student and environmental characteristics and support strategies on post-secondary enrollment in IT education programs and employment. Data for nine school years, 1996 through 2004, will be analyzed through cross-sectional (year-by-year) analyses and over-lapping four-year longitudinal panels. Across all studies, experiences of females will be compared with those of males; experiences of students from various ethnicities and with disabilities will also be investigated.

A Research-to-Practice (RTP) Team consisting of business and practitioner stakeholders will evaluate and interpret findings, develop dissemination strategies, and disseminate project results. Dissemination products will be designed to promote extensive use of practices that encourage successful recruitment, preparation, and inclusion of women and under-represented minorities in high-skill information technology jobs to enhance the lives and opportunities of these individuals and to help resolve the serious national shortage of workers in the IT field.

EIA-0305973
PI's: Elizabeth Lawley and Tona Henderson
Institution: Rochester Institute of Technology
Title: Understanding Gendered Attrition in Departments of Information Technology

Rochester Institute of Technology (RIT) has received an ITWF award to study the experiences of undergraduate women in departments of Information Technology (IT). Most research to date into women's experiences in undergraduate computing programs has focused on Computer Science departments. While IT programs have cast themselves as qualitatively different from traditional CS, it is not clear whether women's experiences in these programs are more positive than in CS, where retention of female students has been consistently problematic.

The study will be done in two parts. The first will be a qualitative study of all women, and a sample of men, entering the IT department at RIT as freshmen. These women will be interviewed upon entrance into the program, at the end of their first quarter, and at the end of the academic year. Based on the information gained in that study, key factors related to women's persistence or attrition will be identified. The second part of the study will be the development of questionnaires for faculty and students intended to identify the presence and influence of those factors in academic departments. The questionnaire will then be administered at departments of IT across the US, in order to determine whether the factors identified at RIT can be generalized across institutions.

EIA-0305146
PI's : Angela M. O'Donnell, Suzan Armstrong-West, Stanley Dunn, Claire McInerney, and Carl Van Horn
Institution: Rutgers University-New Brunswick
Title: The Influence of Gender, University Majors, and Work Experiences on Perceptions and Choice of IT Careers

This ITWF award provides support to study the extent to which

1. Gender, attitudes, perceptions, work experiences, and competencies influence the choice by students of IT-related majors collectively and non-IT majors.
2. Gender, attitudes, perceptions, work experiences, and competencies influence the choice by students in different IT-related majors (Computer Science, Computer Engineering, and Information Technology).
3. Specific technology-involved work experience influences attitudes and perceptions of the IT workforce, interest in IT careers, and choices about continuing with this type of work for more than one year.
4. Recent graduates are working in jobs related to information technology and the degree to which gender, attitudes, perceptions, and work experience during college influence post-graduation career choice among the four different groups of students in this study.
5. Recent graduates believe themselves to be prepared for the IT workforce.

The project will take place over 3 years in a number of departments and on several campuses of Rutgers University. The study combines quantitative and qualitative approaches to understand how men and women make career decisions while in school.

EIA-0302692
PI: Anne O'Leary-Kelly, Bill C. Hardgrave, Vicki McKinney, and Darryl Wilson
Institution: University of Arkansas
Title: The Influence of Professional Identification on the Retention of Women and Racial Minorities in the IT Workforce

This ITWF award provides support to study whether differences in individual characteristics and situational experiences lead women and minorities to develop different levels of professional identification (compared to majority individuals), and to examine the influence of professional identification on the career persistence of IT workers. The PI and co-PI's postulate a multivariate model and 14 specific hypotheses around which their proposed research project is based. Their general proposition is that many antecedent factors that have the potential to influence career retention operate through professional identification. In terms of women and racial minorities, the researchers propose to determine which and/or if antecedent factors are experienced differently by members of these groups and how these differences influence attachment to the profession. The antecedent factors they will study include: (1) motivation for choosing the IT profession; (2) socialization into the IT profession; (3) self-efficacy regarding a career in IT; (4) experiences in the IT workplace; and (5) congruence of professional and other valued identities.

The researchers plan to use the cooperation of a number of employers of IT workers to identify and contact a panel of respondents in a program of original data collection. They will develop a data collection instrument that will be used to create longitudinal records on individuals at 3 time periods.

EIA-0305859
PI's: Jean C. Robinson, Manju K. Ahuja, Susan C. Herring, and Christine L. Ogan.
Institution: Indiana University
Title: Toward Gender Equitable Outcomes in Higher Education: Beyond Computer Science

This ITWF award provides support to investigate 15 tertiary education programs in information science, information systems, instructional systems technology, and informatics, with computer science programs as a baseline comparison, in five major IT degree-granting institutions. The purpose of the study is to determine which universities/departments/programs are most successful at recruiting and retaining female students, and what factors favor female success over time. The programs are hypothesized to be differentially responsive to female students due to differences in academic culture, operationalized in terms of the availability of mentorship, role models, peer support networks, grant programs, and other resources at the departmental, university, and disciplinary levels. These measures of organizational culture will be correlated with measures of student outcomes and self-reports of student experiences. Data about students' experiences will be collected through a web-based survey of a sample of 5,000 students, followed by three face-to-face interviews with an estimated 155 students, over-sampling for females, over a two-year period. In addition, faculty, administrators and staff in the study programs will be interviewed by telephone and in person.

EIA-0306156
PI's: Alberto Rodriguez, Randy Yerrick and Cathy Zozakeiwiz
Institution: UC, San Diego
Title: Improving the Participation and Achievement of Students in Diverse Schools by Enhancing Teacher Professional Development in Science and Learning Technologies (I²TechSciE)

The University of California, San Diego has received ITWF funding to conduct a 3-year long professional development and research project that is based in a diverse school context. A cohort of elementary students will be selected and followed from fourth grade through sixth grade. Each year these students will be placed in classrooms with teachers who are participating in the project. The transformation of the students' knowledge of science and learning technologies, and the teachers' abilities and confidence in the use of learning technologies to teach for understanding, will be studied for 3 full years. In addition, each year a cohort of pre-service teachers will be recruited to student teach in the participating teachers' classrooms. This design aims to provide teachers with multiple opportunities for practicing the skills and content knowledge modeled during the science methods courses, and during the professional

development institutes, in diverse school contexts. The following research questions will be explored:

1. In what ways does an inquiry-based, sociocultural constructivist, and multicultural orientation to teaching enhance experienced and pre-service teachers' abilities to use learning technologies with diverse students in the upper elementary classroom?
2. In what ways does an inquiry-based, sociocultural constructivist, and multicultural orientation to teaching using learning technologies enhance diverse students' attitudes toward and academic performance in science

EIA-0305898
PI's: Roli Varma and Deepak Kapur
Institution: University of New Mexico
Title: The Cross Ethnic Differences in Undergraduate Women's Preference for Information Technology

The University of New Mexico has received an IWF award to support a continuation of the ITWF-funded one-year pilot led by Roli Varma entitled "Why So Few Women in Information Technology: A Comparative Study" (EIA-0120055). The pilot focused on the following two questions along gender and ethnic lines:

(i)   *Why do women who have the potential to succeed in the study of IT disciplines take alternative educational paths?*
(ii)   *What barriers and obstacles must be overcome to attract more women to IT education?*

The pilot utilized the technique of ethnographic interviews to acquire primary data on the subject. Over 65 undergraduate students in different ethnic groups, majoring in computer science or computer engineering, in 4 minority-serving institutions were interviewed.

The full study will have approximately 170 participants and will take place in 5 additional Minority Serving Institutions. By including the examination of ethnicity as well as gender as a factor, the full study aims both at deepening understanding of women's choices and at extending understanding of these choices as expressed in the literature. Cross-gender and cross-cultural comparison will provide a better understanding of the issues related to the lack of participation by women in IT disciplines and careers, and will shed light on the possible differential contribution of ethnicity to gender based choices.

EIA-0305917
PI's: Laurie Williams, Winser Alexander, Sarah Berenson, and Mladen Vouk.
Institution: North Carolina State University
Title: Collaboration through Agile Software Development Practices: A Means for Improvement in Quality and Retention of IT Workers

North Carolina State University at Raleigh (NCSU), North Carolina A&T University and Meredith College have been awarded an ITWF grant for a 3-year study of the collaborative aspects of agile software development methodologies. The project's objective is to perform extensive, longitudinal experimentation in advanced undergraduate software engineering college classes at the three institutions in order to examine student success and retention in the educational and training pipelines when the classes utilize an agile software development model. The project will also involve the development of agile software development materials for software engineering classes.