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AUTHOR Spahn, Karen
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ABSTRACT

This paper presents the results of a research study (Spring 2001 completion) on adult women and minority students returning to a non-traditional four-year university designed for working adults over a five-year period (1995-2000). The study analyzed several unique student populations--graduates (recent and alumni), still enrolled, and not enrolled (stopped or dropped out)--across two modalities (online and face-to-face). The following research questions were examined: (1) What motivated them to enroll in an IT (information technology) degree program? (2) What university characteristics influenced their choice of institution? (3) What facilitated their persistence and/or degree completion? and (4) What employment incentives enabled enrollment and degree completion? A survey methodology was used to gather data. The goal was to obtain an understanding of the backgrounds, motivation, preferences, and support systems that adult women and minority IT students express upon entrance and exit from the University of Phoenix (Arizona). (Contains 18 references.) (MES)

Assessing an Untapped Supply of Information Technology Workers: Adult Women and Underrepresented Minorities.

By. Karen Spahn

Assessing an Untapped Supply of Information Technology Workers: Adult Women and Underrepresented Minorities

Dr. Karen Spahn
Executive Director, Special Projects
University of Phoenix
kkspahn@apollogrp.edu

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Abstract

According to America's leading corporate chief executives, strengthening the technological workforce is the single greatest challenge facing our nation's ability to compete over the next decade (Council on Competitiveness, 1998). Women and underrepresented ethnic minorities have been identified as sorely underrepresented both in the information technology (IT) degree programs and in the workforce (Campbell, Denes, & Mottison, eds. 2000). Researchers have concentrated on increasing the number of K-12 female and minority students interested in, entering and graduating from IT programs in an effort to increase the numbers selecting IT careers. Reaping the fruits of this labor, however, takes approximately 20 years.

There is a large untapped underserved supply of potential IT workers, namely adult women and minorities that could immediately alleviate the growing shortage. The Census Bureau estimates that only 21% of all adults have a baccalaureate degree. Adult students (i.e., over 25 years), however, represent nearly 50% of all credit students in higher education (The College Board, 1998). Little to no research, however, has occurred on adult students let alone adult female and minority students enrolled in baccalaureate and master's IT programs (i.e., computer information systems, information technology and technology management). 10 to 15% of traditional four-year universities enrollment in IT programs is female and minorities. No one knows how many are adult students.

A significant number of adult women and minority students, however, have been enrolling in IT programs at the University of Phoenix for many years. Adult women comprise over 38% and minorities over 36% of the undergraduate information systems enrollments (i.e., average age is 33 years) (*Registration Survey*, 1999).

This study analyzed six unique student populations: graduates: recent and alumni; still enrolled; and not enrolled: stopped or dropped out, across two modalities (i.e., online and on ground) from 1995 to 2000. The following research questions were examined:

- What motivated them to enroll in an IT degree program?
- What university characteristics influenced their choice of institution?
- What facilitated their persistence and/or degree completion?
- What employment incentives enabled enrollment and degree completion?

The goal of this exploratory research was to obtain an understanding of the backgrounds, motivations, preferences and support systems that adult women and minority IT students express upon entrance and exit (i.e., completion or leaving) from the University of Phoenix. By exploring the motivations, preparation, choices, support systems, faculty attributes and perceptions that shape successful students. Colleges, universities and teacher education programs will learn how to encourage, enroll, educate and provide support services to adult female and minority IT students. This study should benefit institutions across the country with low adult participation rates and also increase the number enrolling and completing an IT degree. The number of traditional-age students selecting an IT degree program and career should also increase, as these successful adults will serve as role models to their children and to their communities.

Background

Trained technology professionals are critical to our nation's infrastructure. They are needed to create and develop new ideas, form talent pools for existing businesses and to launch new companies (President's Information Technology Advisory Committee Report to the President, February 1999). According to the Bureau of Labor Statistics (1997), the need for computer scientists, computer engineers and system analysts will double from 1996 to 2006. Even with the demise of a significant number of dot com businesses, it is estimated that 425,000 positions will go unfilled in 2001. The shortfall is projected to continue to increase (ITTA, 2001, p. 4).

According to the 2000 Census, the largest growing populations were the racial/minorities (i.e., American Indians, Asians, Blacks and Hispanics). They constitute about one-fourth of the total U.S. workforce, 30% of the college-age population, and a third of the birth rate, yet comprise only 6.7% of the U.S. computer and information science labor force. The Department of Commerce reported that in 1996 women made up 30% of the IT workforce, Blacks 5% and Hispanics less than 5%. The growing shortage of IT workers will worsen unless more women and they minority groups enter the IT field (Foster, 2000).

There is, however, a large increasing, population of adults (over 25 years) returning to higher education for purposes of obtaining a degree, re-careering and retraining (Kim, 1999). While 82.8% of all Americans, 25 years and older, have obtained a high school diploma/GED, only one-quarter have earned a baccalaureate degree (22.4% of women; 14.7% of Blacks; and 11% of Hispanics). While over 54 million adults have received some formal training from employers in the past year, studies have shown that professionals and managers receive the majority of training. Younger, male and white employees receive more training than older workers, women, and other ethnic employees (Merriam, 2000).

America's workers believe that "higher education is the ticket to the middle class." More than 60% of parents of high school students see a college education as "absolutely necessary." When asked to choose the single factor that most determines success, 67% of Hispanic parents and 45% of African-American parents picked a college education, compared with 35% of parents over all. Almost two-thirds (64%) of workers believe that the primary purpose of a college education is to prepare students for specific careers. (Heldrich Work Trends Survey, June 2000). When asked to choose the single factor that most determine success, 67% of Hispanic parents and 45% of African-American parents picked a college education, compared with 35% of parents overall. "A college education has become as important as a high school diploma used to be" (Wilgoren, 2000).

Adults see the need for higher education. Since the 1970's their participation in education has gone up significantly (Kim, 1999). While data is not available on the number of adults enrolled in IT programs across the country, data from the nation's largest private university shows that significant (and increasing) numbers of adult women and minority students are entering IT programs.

Few to no studies have examined adult students participation in postsecondary IT programs. Most of the research has centered on K- through traditional-age college students. This study provided a unique opportunity to study adult participation in higher education and more specifically, in information technology degree programs. By exploring and understanding why adult females and minority students select an IT academic program to re-career into mid-life and learning what contributes to their successful degree completion, institutions of higher education will learn how to motivate, encourage and support a vast underserved number of potential adult students.

Objectives

The goal of this exploratory research was to obtain the primary reason why adult women and minorities decide to enter an information technology degree program (i.e., undergraduate and graduate, online) and on ground) and to learn about their backgrounds (preparation and family support), motivations, support systems, preferences (i.e., faculty and student support services) and to determine the success factors that contributed to degree completion.

This study analyzed six unique student populations (i.e., graduates: recent and alumni; still enrolled; and not enrolled: stopped or dropped out) across two modalities (i.e., online and on ground) from 1995 to 2000. The following research questions were examined:

- What motivated them to enroll in an IT degree program (i.e., background characteristics, role models, academic preparation, first exposure to technology, career issues, previous educational experiences, etc.)?
- What university characteristics influenced their choice of institution (i.e., education goals, expert faculty, availability of program, online courses, contextual learning, support services, location, peer interactions, recommendations of employer, reputation, etc.)?
- What facilitated their persistence and/or degree completion (i.e., mentors, support systems—personal, financial and educational, motivation to persist, perceived and actual barriers, etc.)?
- What employment incentives enabled enrollment and degree completion (i.e., managerial support, tuition reimbursements, upward mobility, promotion, financial rewards, etc.).

The goal of this exploratory research was to obtain an understanding of the backgrounds, motivations, preferences and support systems that adult women and minority IT students express upon entrance and exit (i.e., completion or leaving) from the University of Phoenix.

Study University

The study university was the University of Phoenix, created in 1976, by Dr. John Sperling. The mission is to provide high quality education to working adults whose access to higher education is limited. Dr. Sperling determined, as documented by Kasworm, Sandmann & Sissel 2000, that adult students were marginalized, if not invisible, in a system where all aspects of support and curriculum favor the traditional-aged student. Adult students participate at the periphery in traditional universities. Many adults cannot participate unless they are unemployed, as the majority of courses are only offered during the day.

Since family and work responsibilities cause time limitation problems (the number one barrier adults have given), the curriculum was created and organized (lock-step) so that working adults focus their limited time on one course at a time. This method facilitates the "learning builds"

philosophy. Initially, the curriculum was limited to programs most important to working adults (i.e., undergraduate and graduate business programs). Dr. Sperling created an integrated model that affords adult students a quality education at convenient locations and times.

Classes at the University of Phoenix begin at 6:00 p.m. and last for four hours one day a week for five weeks at the undergraduate level and six weeks at the graduate level. Each course has a required learning team component where small groups of students are required to meet each week to mutually research a topic beneficial to the group, write a research paper and if time permits present the outcomes to the class. Many courses require both multiple individual and study group outcomes.

Additional academic programs in counseling, education, nursing, and technology were added in the 1990's when the need and demand for them became apparent. More recently programs in Justice Studies, Human Services and a Doctorate in Leadership Management have been added.

Initially, to gain admission to the university, students had to have completed 60 hours of postsecondary credit and be full-time employed. This criterion was changed in late 1994 to meet the need of military students. Now a student must be 23 years of age, working, and have a high school diploma. Currently, if a student does not have 24 hours of accumulated lower-division credit, he/she must enroll in the Introductory Course Sequence program. Upon successful completion of this program, he/she can apply to a specific academic degree program.

Support services also custom designed to meet the needs of working adult students. Once the student decides which day of the week to attend, his/her academic counselor enrolls the student for all of the sequenced courses in the respective academic program. Students know their graduation date on the first day of class. Class sizes are kept small (12 to 15 on average on-ground and 8 to 10 students on average online) so that all questions can be answered and the curriculum can be thoroughly digested. Classes begin every day of the week (except Sunday) and every week of the year (except Christmas week). If changes need to occur, the student's personal academic counselor handles all scheduling changes. Books, modules, and supplemental reading materials are mailed and/or obtained via a web site. Course schedules and grades are posted on the web, for secure access by students. An online library provides timely, up-to-date library materials for all students. Library agreements have been negotiated with on-ground public libraries to provide additional resource materials.

The University currently enrolls over 94,000 students in 34 geographically large and diverse cities across 19 states, Puerto Rico and Vancouver, British Columbia. Almost one-quarter of the students are enrolled in the Online campus.

Online Campus

In 1989, the Online Campus was an outgrowth of the University's mission to serve adult learners by providing a variety of academic options and opportunities. It was also a response to increased demand by traveling professionals who were unable to stay in one spot for any length of time. The Online campus allowed them to complete their degree: any time, any place in the world. Other professionals who did not have access to higher education also had an opportunity to complete their degrees.

Initial research and development focused on selecting a technology (i.e., asynchronous) that would preserve the interactive qualities of the learning model already in existence in on-ground facilities. It was equally important that the technology be commonly available and easy to operate. Computer conferencing met both criteria and enabled an open environment that allowed students to use any kind of computer and modem.

Online students and faculty received training on how to operate the system. not only receive regular faculty training but additional training on teaching in the online environment. Both students and faculty receive 7-day, 24-hour technological support. The online course completion rate is 95% and the graduation rate is 65%. The learning outcomes for online students are also higher than for on-ground students but this may be due to a higher ability level student selecting the Online campus.

Faculty

The faculty are also working professional adults. They must have at least a graduate degree from a regionally accredited institution earned a minimum of two years prior to their application to teach. Their degree must be in the area in which they will be teaching. Faculty must have a minimum of five years of significantly responsible, current experience on the job in the same area in which they will be teaching. The practitioner faculty ensures that the curriculum is up-to-date and accurate as they are the content experts (i.e., understanding from first-hand experience). Similar time constraints that working adult students endure are also endured by the faculty.

Before a faculty member is hired, he/she must pass an extensive screening process. If they pass the screening process, they then must pass the training sessions. Faculty are taught how to teach to adult students. They go to class just like students in the evening and receive extensive training in several areas (i.e., Adult Learning Theory, facilitative methods, contextual learning, diversity, ethics, assessment, feedback methods, grading, etc.). Once they successfully complete their training (i.e., 6 to 8 weeks), they are formally hired to teach a course. Generally, faculty are only certified to teach one to two courses. Their first teaching assignment is conducted with a seasoned mentor faculty member in attendance. The mentor stays in the background throughout the entire first course and gives feedback to the new faculty member (i.e., teaching tips).

Faculty must attend several professional development workshops and seminars annually to remain active. Additionally, faculty receive student evaluations at end of all courses (i.e., Student End of Course Survey). Administrative reviews (i.e., the Director of Academic Affairs and the Curriculum Chair) are performed twice a year in the classroom. All assessments are done to improve and enhance the faculty member's teaching skills. If a faculty is found to be deficient in an area, he/she is scheduled to attend a professional development course on that particular deficiency. Most faculty welcome the assessment feedback. They want to know that they are doing a good job of teaching.

Faculty must teach to the mandated course outcomes as these are the outcomes students will be assessed on at the end of their academic program. Faculty may embellish (i.e., add to) the curriculum, but they cannot eliminate or change the required elements. By mandating the same outcomes in all identical courses, the University can determine which campuses and modalities are more effective. Any change to the curriculum can also be measured against the standard set. The University knows whether a change will increase and/or decrease student learning.

Assessment

Assessment of all educational activities and processes occurs daily. The University has an extensive award-winning assessment program comprised of two systems: The Adult Learning Outcomes Assessment (ALOA) and the Academic Quality Management System (AQMS). The ALOA system is comprised of a series of cognitive (i.e., academic program outcomes, mathematics and English), affective (professional and educational values), communication (written and verbal) and critical thinking assessments. The assess-ments must be taken at entrance into an academic and upon completion of the student's academic program (i.e., required for graduation).

The AQMS system is comprised of a series of surveys to measure institutional effectiveness. All students and faculty must complete an end-of-course survey for every course taken and taught. The

end-of-course surveys provide evaluations of the curriculum, the textbooks and materials, the adequacy of the online library, the faculty member's skills and abilities (faculty evaluate student preparation, participation, etc.), the study groups/learning teams, and support services (i.e., staff and administration, financial aid, parking, facilities, etc.). The outcomes of these surveys are analyzed immediately and given back to the campus Director of Academic Affairs. The faculty member also receives a summary after grades are posted. The timeliness of the feedback to the campus and to the faculty member means that improvements, if needed, can be accomplished immediately.

Student Demographics

The average on-ground undergraduate student is 34.7 years of age, is female (57%), married, has two children, 13.6 years of business experience, earns $61,000 a year, seeks a business degree and has previously attended three to four higher education institutions. 93% of the students bring previous academic credit with them. 4 to 5% have earned a degree. Over 40% of the students are first-generation students and 42% are from a minority group (1% American Indian, 4% Asian, 13% Black, 1% Native Hawaiian, 1% Pacific Islander, and 22% Hispanic) (University of Phoenix *Fact Book*, 1999). 65% plan to pursue graduate education and 25% of the graduate students plan to earn a doctoral degree. Graduate students are older (36 years); and are in higher level positions of authority (25% executive/manager/administrator compared to 20% for undergraduates).

Until the technology programs were offered online, the average Online student was older (36 years), male (65%), White (81%), in a graduate business program (MBA) and employed in a higher level position (69% executive/manager/ administrator). With the advent of the technology programs the demographics of the Online campus are shifting to resemble on-ground students: average undergrad is female 55% with an average income of $75,000, 37.5% are first-generation, 90% have attended another higher education institution. The average Online graduate student is male 82%, age 36.8 years, and earning $85,000. The average Technology student is male 67%, age 34 years, married, income $66,000. 30% of the BSIT students work as technicians for an IT company, 65% planned to obtain a graduate degree.

Academic Programs

Not all of the 34 major campuses and over 128 learning centers offer all academic programs. The programs offered are based on the needs of the local community. IT programs are offered in the following locations: Arizona (Phoenix and Tucson) California (San Diego, San Jose, Los Angeles area, Sacramento), Colorado (Denver and Colorado Springs), Florida (Tampa, Orlando, Ft. Lauderdale, Jacksonville), Hawaii (Honolulu), Louisiana (New Orleans), Maryland (Baltimore), Michigan (Detroit and Grand Rapids), Nevada (Las Vegas), New Mexico (Albuquerque), Ohio (Cleveland), Oklahoma (Oklahoma City and Tulsa), Oregon (Portland), Pennsylvania (Philadelphia), Utah (Salt Lake City), and Washington (Seattle). IT enrollments in the Online Campus (enrollments in all states and 22 countries around the world, Vancouver, British Columbia, and San Juan, Puerto Rico campus were also included.

The IT programs are administered by the College of Information Systems and Technology, within the John Sperling School of Business. The IT programs at the undergraduate level are:

Bachelor of Science in Business/ Information Sciences (initiated 6/1994): The BSB/IS is designed to enable graduates to deal effectively with information technology components that have become an integral part of today's increasingly complex business environment. The program stresses skill development in the technical areas of computer hardware and software architecture, file and data structures, systems analysis and design, programming, software engineering, telecommunications, and management of the information systems function. Each student completes a major project in an information systems area that is related to his or her professional responsibilities and that

demonstrates the ability to integrate a variety of business and technical skills in the solution of a problem. The IT courses provide a solid grounding in each of the components of integrated information systems. By combining business and information technology, students develop the ability to apply the tools and techniques of information technology to meeting the goals and objectives of business.

Bachelor of Science/Information Technology (initiated 10/1998): The BSIT program focuses on the acquisition, deployment and management of information technology resources and services, as well as the development and evolution of technology infrastructures and systems for use in organization processes. There are five specialties: Web Management, Database Management, Business Systems Analysis, Networks and Telecommunications, Programming and Operating Systems. The core courses provide fundamental knowledge and practice in both the information technology function and in system development. The specialty courses of the program are extensions in breadth and depth of the technology core courses and enable the student to choose one or more areas of special expertise in an IT area. The curriculum is designed to produce graduates ready to function in information technology positions with the competencies, skills and attitudes necessary for success in the workplace and forms the basis for continued career growth, lifelong learning as an IT professional or in a future graduate program. The coursework is in keeping with the curriculum guidelines set forth by the Association for Computing Machinery (ACM), the Association for Information Systems (AIS) and the Association for Information Technology Professionals (AITP) in "IS '97, Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems."

Bachelor of Science in Business/E-Business (initiated 2/2000): The BSB/EB blends business and information technology to address the emerging field of e-Commerce and e-Business. The program provides fundamental knowledge and application in both business and information technology. Coursework includes management, organizational behavior, critical thinking, research and evaluation, financial analysis, and marketing along with business system development, project planning, operating systems, programming, databases, networks, and telecommunications, the Internet, Web and e-business. The curriculum is designed to produce graduates ready to function in e-Business positions.

IT programs at the Master's level are:

Master of Science in Computer Information Systems (initiated 9/1992): The MSCIS is designed for students who wish to integrate the different disciplines of information technology in a business applications context from a management perspective. Courses cover the key concepts of information technology, information systems management and interpersonal and organizational communications.

Master of Business Administration/Technology Management (initiated 8/1994): Students who enter the MBA/TM program are working professionals who have responsibilities in a wide variety of technical, business, management, and support functions of the technology-based enterprise. The importance of management in a technical environment is a core concept. "Technical" is defined much broader than computer information systems and technology; it includes engineering, pharmaceutical, chemical, and other technical areas. The program is dedicated to the linkage of technical and business cultures as integrated functions of the technology-based organization and to the creation and maintenance of an innovative environment for the management of change throughout the creation to application of technology development.

Study Population

The study population included all female students and minority male students in the IT programs enrolled from January 1, 1995, through August 31, 2000. Initially, this number was reported to be

over 8,500 females and over 8,900 underrepresented minority students. While this number was quite substantial, in January 2001, the IT department informed the principal investigator that over 33,000 students were inadvertently omitted from the initial dataset. This was not a random error. The total dataset included white males and once they were removed and the racial/ethnic characteristics were determined the total population numbered over 21,000 students [See Table 1.).

Methods

The initial population to be studied numbered 15,000+ students. In January 2001, the information technology department informed this researcher that they found an error in the programming. The total study population was closer to 48,000+ students. The error was not random ergo a sampling procedure could not be done.

Due to a change in the student information systems, the majority of racial/ethnic descriptions are contained in a separate database. It was necessary to cross this database with the new extract from the new student information system. This process was a quite time consuming. There was not a unique list of racial/ethnic identifiers. Over 175 different racial/ethnic codes were used for the majority of students. It took close to two months to determine the population (N=21,745) for this study.

Since the size of the population increased significantly, the planned procedure (i.e., use of scanning surveys for on-ground students and an e-mail/web survey for online students) was too costly. The most cost efficient method was to conduct an e-mail/web survey for all students. The IT department obtained all e-mail addresses (i.e., good and obsolete e-mail addresses from an older in-house conferencing system) in the student information systems (many unusable e-mail addresses). Regular mail addresses were obtained for the subset with no e-mail addresses. A letter from the President requesting the non-e-mail students go to a web site was created. A unique ID and password was inserted into each letter so that students could enter a secure web site and take the survey. The initial mail-out of e-mails and the letters occurred in June 2001.

This paper presents the first wave of student responses and is NOT representative of the greater population but does give some interesting findings.

Student Populations

Six different populations comprised the study of adult woman and minorities enrolled in an IT programs at University of Phoenix from 1/01/1995 to 8/31/2000. They are displayed in Table 1.

Table 1. Study Population: IT Enrollments 1//01/95 to 8/31/2000

Female: White & Minorities	ONLINE		ON-GROUND	
	Undergraduate & Graduate		Undergraduate & Graduate	
	Female	Male	Female	Male
Graduated	1,176	675	273	256
Still Enrolled	5,733	3098	2,413	752
Not Enrolled	3,946	1,245	1,835	454
Total Modality	15873		5,872	
TOTAL	21,745			

NOTE: Not Enrolled contains students who have temporarily stopped as well as dropped out. Since the University operates on a daily basis (continuous enrollment and graduation), many students stop-out for short periods of time (i.e., work, vacations, health, family, etc.).

Methodology

This research used survey methodology. Use of surveys is the most efficient way to obtain a large number of responses on background characteristics, motivations, choices, etc., on a large broad representation of gender and racial/ethnic populations across a wide geographical area. The cost to obtain this volume of data using other techniques would be prohibitive. Time factors also prohibited other methods.

The questions on the three unique surveys (i.e., graduated, still enrolled and not enrolled) were comprised of items from national surveys as well as questions derived from an advisory committee of senior faculty and the Dean of the School of Information Technology. The national surveys used were:

Faces of the Future from ACT and the American Association of Community Colleges. The community colleges have also experienced increasing enrollments of their adult students as well as an increase in the number of students selecting an IT field. Areas that are covered on this questionnaire that was recently used on more than 100,000 community college students are: General Background (gender, race/ethnic, native language, income and personal education finances, parental education level, broad based life goals); Employment Background (current employment status, occupational field, employer compensation for education); Educational Experiences (highest academic degree earned to date, current academic effort, other academic institutions attended, academic goals, relationship between college attendance, course taking and employment); Current College Experiences (reasons for attending this college, satisfaction with the college, impression of the campus climate, areas of growth while at college.

1999 National Household Education Survey from the U.S. Department of Education, National Center for Education Statistics. This survey has been conducted since 1991 on adult participants engaged in some for of instruction or educational activity to acquire the knowledge, information, and skills necessary to succeed in the workforce, learn basic skills, earn credentials, or otherwise enrich their lives. The NHES begins with a screening of a representative sample of households. Because of high costs associated with screening large numbers of households, more than one survey is addressed concurrently. 6,977 interviews were conducted in both English and Spanish on the following areas: Initial background, English as a second language, basic skills and GED preparation, credential, apprenticeship, career or job related activities, other formal structured

activities, computer-only or interactive video-only instruction, remaining background, and household characteristics.

Registration Survey (1995-2000), University of Phoenix. Registration data on the over 13,000 women and minorities that entered an IT program from 1/1995 to 8/31/2000 was obtained in the following areas: Decisions to attend a particular university, major personal and professional goals, job title, occupational area, financing education, owning a personal computer, perceived obstacles, years of full-time employment, race/ethnicity, age at enrollment, gender, annual salary, and annual household salary.

Exit Survey (1999), University of Phoenix. An exit survey on Phoenix and Southern California students was conducted in 1999. The areas covered were: Reasons for either stopping or dropping out (personal, employment, finances and academic).

Alumni Survey (1998), University of Phoenix. Over 8,000 graduates in 1997 and 1998 were surveyed using a telephone card as incentive. The following areas were surveyed: Age, race/ethnicity, gender, number of dependents, annual salary, internet access, current employment status, current academic status, plans for future education, occupation, job title, name of employer, years with this employer, level of responsibility, number of job changes, rating of education in preparation of over 25 areas (professional knowledge, critical thinking, management skills, etc.), comparisons to other educational institutions attended, study group experience, rating of the quality of 12 campus services, obstacles to degree completion, and financing of education.

These instruments were scrutinized by an advisory committee to determine the number of items from the national surveys and from local surveys that were included in the three unique surveys. Particular attention was made to ensure that the questions lead to appropriate comparisons to national populations.

A sixty-minute telephone card was used as an incentive for students who completed their surveys. The telephone card was mailed out upon receipt of the survey. This incentive has proven effective with adult students in a previous survey (i.e., Alumni Survey had a 40% response rate).

Preliminary Responses

Due to the short survey response period, the responses received to date are NOT statistically representative of the greater population but given here to initiate a discussion. Caution must be used when interpreting the preliminary results.

Still Enrolled:

- 66% are female, average age 41 years, 33% of the females are from a racial/ethnic minority group; while 50% of the males are Hispanic and 50% are Black.
- Females reported earning $26,666 on average but their reported household income was over $100,000. Males reported earning $50,000 with an average household income of $70,000.
- Males reported 2.6 dependents while females reported 1.6 dependents
- None of the females reported being the first generation in their family to enroll in higher education, but 33% of the females stated they were the first in their family to be in a technology field. Caucasian and Asian females were more likely to have parents with

a college degree. 100% of the males reported to be the first in higher education and in a technology field.

- All reported that English was their first language and that they spoke and wrote fluent English.

- Men reported using a computer for the first time at an earlier age than women (22 years on average versus 26 years).

- First used a computer:
  50% reported first using a computer at work; 33% at school; and 17% at home.

- First use of a computer:
  60% reported using a computer for word processing and playing games; 40% for programming; 20% for e-mail, homework and doing mathematics. Men reported using a computer in the early 1980's, while women were more recent to computer usage (i.e., after 1995).

- 60% reported not being interested in computers or technology in high school; 20% were somewhat to very interested.

- The highest rank skill leaving high school was speaking English; the next was critical thinking; followed by a tie between English writing and creativity.

- The number one ranked response for "what was the primary motivator for selecting a technology field" was "myself" followed by a family member and employer.

- 100% went directly to higher education after high school (60% to a community college and 40% to a 4-year university). The majority of minority students went to a community college first. 60% reported that technology was not their academic major.

- The average number of postsecondary institutions attended was two. 80% reported attending four or more semesters (60% reported accumulating up to 60 credit hours). 40% had received an AA degree and/or accumulated credit while 20% reported receiving a certificate.

- 75% owned their own computers while 25% reported having access either through work of another family member.

- Over 90% reported having an opportunity to complete a degree at a convenient time in a reasonable period of time while working full-time.

- 60% were planning on changing their career once they obtained their diploma; while 40% wanted to be promoted. They all indicated wanted a salary increase and that this was a benefit for their personal development.

- Prior to enrolling, the majority rated themselves as:
  - advanced to expert in accessing the web and using e-mail
  - advanced with word processing
  - intermediate with PowerPoint
  - no skills with spreadsheet

- 80% reported having full tuition reimbursement from their employer while 20% were using their own funds to finance their education.

- Learning teams ratings were exceptional high from all responders (i.e., equal participation; supportive atmosphere; accepting; members skills and abilities) but the majority stated there were not enough women and too few minorities.
- 60% were for an IT company; 20% for a financial business; and 20% in manufacturing.
- 20% worked as technicians, in engineering; in administrative; in administrative support; and 10% in communication and state and local government.
- The average length of employment was 11.25 years and 7 years on the current job.
- 80% reported that their degree program was not related to their current job.

Open-ended responses requesting information on how to improve or better assist women and minorities were most telling:

> "I think this field is perceived as too geeky or too difficult." (female)
>
> "Men in groups should not place unreasonable expectations on the women with less experience with computers." (female)
>
> "It is a great field to work in. (male)
>
> "There might be more opportunities to telecommute, have more flexible hours, which is my motivation." (male)

There were no responses received to date from the not enrolled students and too few graduate responses to include at this time.

Conclusion

The total results of this study should be available by October 2001. The final report will be distributed to those in attendance.

Knowledge of what contributes to motivate adult females and underrepresented minorities to obtain an IT degree and what factors enable the successful completion of an IT degree should provide administrators, provosts, deans (i.e., technology and education) and faculty and faculty training programs across the country with tools that can increase the number accessing, persisting and graduating. Knowledge of the barriers that inhibit and discourage successful completion of IT degrees will also be beneficial. By cultivating and increasing the number of adult women and minority IT diploma-seekers today through the narrowing of the gender and ethnic education gap, new IT leaders will be available within one to five years. This contrasts to waiting 20 years for the fruition of programs aimed at increasing the number of K-12 students entering the IT workforce. Employers may also benefit, if tuition reimbursements and supervisor support prove to provide support needed by women and minorities. America's workers want more than access to technology, they want to tap opportunities generated by the high-tech workplace and ensure that their children and grandchildren have the opportunity to do so (Heldrich Work Trends Survey, February 2000).

If the ethnic and gender education gap is to be narrowed substantially and rapidly, major efforts will be required from universities, families, communities, and from the private and public sectors at all levels (The Council of Economic Advisors, 2000). Changing deep-seated inequalities is a gradual process. Technology-delivered programs hold great potential for addressing inequalities.

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