ISSN: 2167-1435
v30 n2571

IT educational experience and workforce development for Information Systems and Technology students

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Abstract

This study involves an analysis of a cohort of student's during their pursuit of a Bachelor of Science degree in Information Systems Technologies (IST) at a Midwestern university. Demographics and analysis of this cohort include basic demographic information, student home-life and personal responsibilities, employment and work experience, and their academic experience while attending a 4-year public institution. Fifty-three students in an IST program provided responses and perceptions to this survey. Over three quarters (> 75%) of the respondents identified that they were working during their degree with a high percentage on non-traditional students identified in this study. Program content and preparation for employment in the Information Technology (IT) field/profession were assessed. Findings and conclusions of the perceptions of this cohort's responses to the survey are provided.

Keywords: Information Technology (IT), IT experience, workforce development, IT/IS undergraduate students, non-traditional students.

1. INTRODUCTION

This paper aims to investigate potential personal, academic and professional factors that may influence the non-traditional students' choice to learn IT skills beyond the classroom instruction. In addition, we want to investigate opportunities for offering outside of classroom activities that can help prepare students with IT skills in demand for the job market. We will also discuss the students past, current and future IT related jobs and the skills (or the lack thereof) needed for their jobs.

The world of employment in applied Information Technology (IT) and Information Systems (IS) is continually reshaping educational curriculum and the workforce. Preparing graduates to meet these demands for present and future workforce skill sets are pushing educators to increasingly understand the constantly evolving demands of the IT/IS profession *and who the student is* that is pursuing an IT/IS degree through higher education.

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Present projected employment trends in the computer and mathematical occupations identified in the U.S. Department of Labor's (DOL) *Occupational Outlook Quarterly (OOQ) for the 2010 – 2020 job outlook in brief* (2012), identified that computer occupations will grow at an overall average rate of 22% through 2020, faster than average for all other occupations.
This report identified eight computer occupational categories and their occupational growth through the year 2020. Table 1 below provides this information with estimated growth potential:

Occupational Category	Percent Growth
Computer and Information Research Scientists	19%
Computer Programmers	12%
Computer Support Specialists	18%
Computer Systems Analysts	22%
Database Administrators	31%
Information Security Analysts, Web Developers, and Computer Network Architects	22%
Network and Computer Systems Administrators	28%
Software Developers	30%

Table 1: Computer Category Occupational Growth through 2020, (DOL, 2012, p. 12)

CompTIA (2012) further performed an international study of 1,061 IT businesses involved with managing IT or IT staff within their organizations. The purpose of the study was to identify IT skills gaps presently facing the profession. Respondents of this study identified 15 technical skills or skills gaps that will be needed to meet the demands of increasing technology and the profession. These IT skills gaps are provided in Table 2 below in order of priority and percent response:

2. BACKGROUND

The increasing number of non-traditional students in undergraduate programs is changing the student demographics in higher education (Cantwell, Archer, & Bourke, 2001), and is pushing universities to offer academic activities inside and outside of classroom that addresses the students need to balance their personal, academic and professional life while pursuing their degrees (Forbus, Newbold, & Mehta, 2010).

According to Horn (1996), the most common definition of "nontraditional" is based on age, whereas, students of an age of 24 and older are considered nontraditional students.

Industry Technical Skill Gaps	Percent Response
Cybersecurity	88%
Data Storage/Backup	88%
Updating of aging Computers/Software	82%
Network Infrastructure	82%
Disaster Recovery/Continuity	81%
Automating Business Processes	73%
Web Online Presence/e-Commerce	64%
Collaboration	63%
Telecommunications	62%
Virtualization	61%
Business Intelligence/Data Analytics and Mining	59%
Cloud Computing	50%
Social Networking Technologies	41%
Green IT	38%

Table 2: CompTIA IT Skills Gap , (2012, p. 5)

Figure 1 shows the enrollment of students in Title IV institutions in United States in the fall 2009. Out of 20,966,826 students enrolled, 39.3% are students of age 25 or older, which are considered the non-traditional students (Ely, 1997).

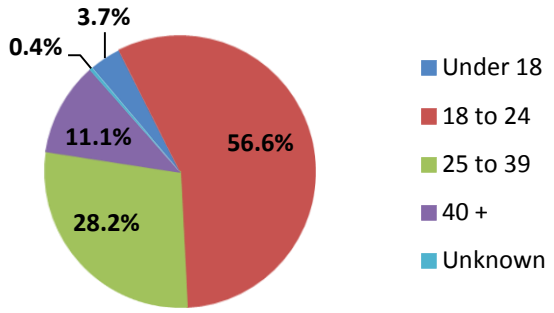

Figure 1: Percentage of enrollment in Title IV institutions by student age in United States, Fall 2009 (chart created with data from Knapp, Kelly-Reid, & Ginder, 2011, p. 10)

Gilardi & Guglielmetti (2011) argue that employment and job security can represent

limitations for non-traditional students investing time in person development within the university and that the type of employment contract can have an impact on retention. Forbus et al. (2010), nonetheless, contend "that working does not have a negative effect on learning (grade point average), but also shows that working hinders involvement, which has a positive effect on learning" (p. 71).

Aud et al. (2012) reported that "in 2010, about 40 percent of full-time and 73 percent of part-time college students ages 16 to 24 were employed" (p. 92). As traditional students are working too (Forbus et al., 2010) for of any kind of reasons (e.g.: loans, living expenses, etc.), they may be also in need for opportunities to learn and practice their IT skills outside of formal classroom interactions. Students can find several extra-curricular activities within their School and Departments, such as attending guest lectures, joining a student club, participating in workshops, or volunteering for community services within their area of expertise. Nonetheless, in many cases these are synchronous activities and required not only a time commitment but also the need for physically being in a certain place, which is unfavorable for many working students.

Indeed, students are becoming more connected and ubiquitous. According to the ECAR Study of Undergraduate Students and Information Technology, 2012 (Dahlstrom, 2012, pp. 13-14), a large number of students have portable devices. Laptops, in first place, represent 86% of the students with devices (i.e., almost 9 out of 10 students), and Smartphone comes in second place with 62% of the students. Tablets and e-readers combined account for 27% of the student devices. These devices combined with a plethora of social networks and tools can generate opportunities for continuing education beyond the classroom settings and beyond restrictions of time and location.

With the increasing availability of digital devices and the opportunity of educational activities, these technologies may be able to enhance a nontraditional student's persistence and attainment of their educational goals. Thus, potentially minimizing the impact on the balancing of work, education, and life balance.

The ECAR Study (Dahlstrom, 2012, p. 11) shows that students wish instructors used more open educational resources, simulations or educational games, course or learning management systems, E-books, Web-based videos, Video-sharing websites, podcasts and webcasts and more. In addition, some of the key findings from the ECAR Study also reveal that:

- "Blended-learning environments are the norm; students say that these environments best support how they learn" (p. 7)
- "Students expect their instructors to use technology to engage them in the learning process" (p. 9)
- "Understanding which technologies are more or less effective for students can translate into strategic pedagogical investments" (p. 10)
- "Students believe technology benefits them, especially with regard to achieving their academic outcomes and preparing for future plans" (p. 19)

Information Technology is a field that is constantly changing. By the time students are learning something in class, the technology may have already advanced. For example, the software installed in classroom computers may be a few versions behind the current version. It is almost impractical to go back to school every time we need to update or learn new technologies as well as for schools to teach everything that students need to know before they graduate. Therefore, a professional in the IT field must "learn how to learn" for an effective lifelong learning (Neame & Powis, 1981) and to keep up with the changes in the field.

Relating to the factors contributing to an IT skills gap as reported in the CompTIA (2012) study, 46% of the respondents believed that the fast changing technology makes it difficult for IT workers to stay current with their skills, 39% reported that IT training/education does not sufficiently translate to workforce performance, and 15% responded stating there was insufficient focus on Science, Technology, Engineering, and Mathematics (STEM) education (p. 16). Further, this study asked how the organizations plan to address IT skills gaps through investing in training for existing staff. Of the companies reporting, 57% stated they will train or retrain their existing staff, and only 6% stated they should contribute or support programs designed to boost STEM education to increase the pool of students entering these technical fields (p. 21). Given the responses provided above from this study, it would seem imperative that industry and education work closely together to develop educational

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curriculum to meet the needs of this IT skills gap.

Legier, Woodward & Martin (2012) suggest that "a steady supply of IT professionals to the business community is necessary for our nation to remain competitive in the global market, and educators must train and support the next generation of IT specialists" (p. 1-2). Their study lists the graduates' primary IT job focus and how well their curriculum prepared them for their jobs. Sanchez-Morcilio (2012) also reports the alumni competencies in relation to technological skills.

3. METHODOLOGY

The survey included 31 questions about individual student demographics, home-life while enrolled in the Information Systems Technologies (IST) program and attendance at the university, present and past work experience in the IT profession, and academic experience. All questions pertain only to the time students spent attending the university. The subject population was composed of 200 students enrolled in an IST program of a Midwestern University in spring 2011, with a response rate of 26.5% (i.e., 53 respondents).

The study was approved by the Office of Research and Development at the university. Faculty members in the IST program were provided information about the study and were asked to distribute the information to all IST students in their classes.

The survey was developed and administrated through the online survey application, LimeSurvey. All respondents were informed of their confidentiality and were provided with a confidentiality agreement statement prior to beginning the survey.

4. RESULTS

Student Demographics

Questions 1 through 5 addressed basic student information to include gender, age, employment status, year in college, and current Grade Point Average (GPA). Figure 2 shows the percent gender in this study.

This disproportionate percentage of males to females in the IT profession is consistent with the results identified by Aud et al. (2012) study.

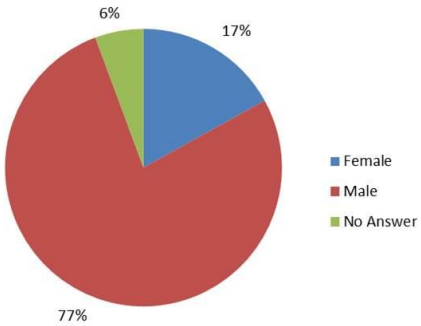

Figure 2: Gender Percentage

Question 2 asked the age of each respondent with an average age reported of 28 (*SD* 10.97). The maximum age provided in the survey was 62, with the minimum age provided as 19.

Additionally, the survey asked for respondent present employment status (Figure 3).

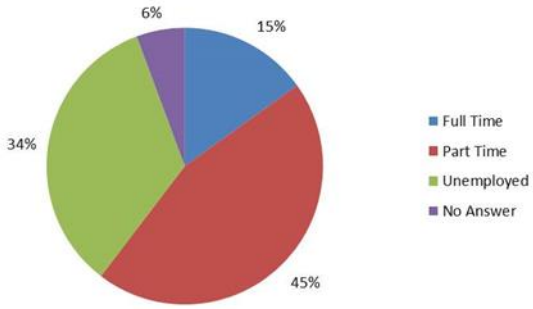

Figure 3: Employment Status

Question 4 asked for respondents to provide their present year in the IST program/college. Approximately 57% of the respondents were Seniors, 26% were Juniors, 9% were Sophomores, and approximately 2% of the respondents were Freshman. Approximately 6% of the respondents did not provide their year in college.

As part of the student demographics, GPA was requested of each respondent. Ninety-four percent (94%) of the respondents provided their GPA. Of the 53 respondents, the mean GPA was 3.26 (*SD* 0.52). The maximum GPA reported was 4.00, with a minimum GPA reported of 2.30.

Student Home-Life while attending College

Questions 6 through 11 were designed to evaluate what students face outside the educational environment that may impact on

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their performance during their program/college experience. These questions included marital status, spouse employment, number of children and any other responsibilities related to other dependents.

Approximately 68% responded as single. Nineteen percent (19%) responded as married. Six percent (6%) were divorced and approximately 2% were in a domestic partnership. Approximately five percent (5%) did not provide an answer to the question.

Twelve percent (12%) of the respondents stated that their spouses are either employed full or part time. Two percent (2%) identified that their spouses were full time students and approximately 4% of spouses stay at home.
Further, respondents were asked to provide the number of children they have. Nineteen percent (19%) of the respondents to this survey stated they have children. Of those responses, respondents identified that they have between 1 and 5 children, with 25% of the responses stating that they are responsible for "other dependents".

The final question in this category asked "*Are you the primary source of income for your family*?" Of the responses, approximately 42% answered Yes, and 53% answered No.

Student Employment and Work Experience
Questions 12 through 18 addressed the student's employment while attending the IST program/university.

Question 12 asked the respondents to provide their average hourly wage at work while attending school. Of the 53 respondents, 38 (72%) reported earnings between $8.25 per hour (minimum wage) and $10.00 per hour. Six (approximately 11%) of the respondents reported earnings between $10.00 per hour and $15.00 per hour, and 6 or approximately 11% reported earnings greater than $15.00 per hour.
Additionally, respondents were asked how many hours per week did they work while attending school. Table 3 below provides the responses to the question.

As identified in table 3, approximately 77% or over three-quarters of the students responding to this survey, stated that they worked while attending school. This information further leads in to the question of what were the reasons you worked while attending school.

Amount	Count	Percentage
I did not work	9	16.98%
< 10 Hours	7	13.21%
10 to < 20 Hours	13	24.53%
20 to < 30 Hours	15	28.30%
30 to < 40 Hours	1	1.89%
> 40 Hours	5	9.43%
No Answer	3	5.66%

Table 3: Average number of hours worked

Table 4 below provides the responses for the main reasons a student chose to work while attending school (*respondents were asked to check all that apply*).

Reason	Count	Percentage
Tuition	15	28.30%
School Supplies	25	47.17%
Living Expenses	38	71.70%
Travel/Vacation	6	11.32%
Phone/Computer	19	35.85%
Clothing	20	37.74%
Vehicles	14	26.42%
Social Events	22	41.51%
Support of Family Members	10	18.87%
Other	9	16.98%

Table 4: Reasons for working while attending school

Further, the survey asked respondents "*While pursuing your degree, how many IT related jobs have you had*?" Fourteen or 26.42% responded that they have held 1 IT related job, 11 or 20.75% stated they have held 2 IT related jobs, 2 or 3.77% identified having 3 IT related jobs, and 1 each or 1.89% each responded that they have had 4 to 5 IT related jobs while pursuing their degree. Additionally, 21 or 39.62% responded that they have not held an IT related job during their degree pursuit.

Position	Count	Percentage
Phone Support / Troubleshooting	16	30.19%
Programming	3	5.66%
Database Management	5	9.43%
Systems Analysis	7	13.21%
Consultant	1	1.89%
Web Design	7	13.21%
Web Development	2	3.77%
Networking	17	32.08%
Information Security	6	11.32%
Other	21	39.62%

Table 5: IT job description/position held

Of the respondents that stated that they had held an IT related job, question 16 provided a list of IT related jobs for respondents to choose which of the job descriptions/positions they have held. Table 5 below provides the responses

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(*respondents were asked to check all that apply*).

As noted above, Phone Support/Troubleshooting and Networking provided the largest number of responses to the question. The "Other" category or 21 responses (39.62%) identified positions as Technicians, computer setup and support for family and friends, and the largest amount of responses stating that they have not held a job under the list of positions provided.

Additionally, this portion of the survey asked the respondents if they were going to pursue an IT related job upon graduation. Of the respondents, 44 (83.02%) answered Yes, 6 (11.32%) answered No, and 3 (5.66%) did not provide an answer.

The final question in this section relates to the responses given in the paragraph above, asking what kind of IT related job do you plan on pursuing. Table 6 below provides the responses to the kind of job the respondents were interested in pursuing (*respondents were asked to check all that apply*).

Position	Count	Percentage
Phone Support / Troubleshooting	10	18.87%
Programming	10	18.87%
Database Management	12	22.64%
Systems Analysis	14	26.42%
Consultant	6	11.32%
Web Design	12	22.64%
Web Development	11	20.75%
Networking	27	50.94%
Information Security	22	41.51%
Other	4	7.55%

Table 6: Type of IT job position pursing after graduation

The data above shows that the most sought after IT related job positions by the respondents include: Networking, Information Security, Systems Analysis, and Database Management and Web Design, respectively. For the "Other" category, respondents listed jobs such as Network/Systems Administration, IT Management, and Project Management.

Student Academic Experience(s)

Questions 19 through 31 of this survey deal with a student's academic experience while pursuing their degree and attending college.

Questions 19 and 20 asked the respondents for the semester and year entering the IST program and their expected graduation dates. The purpose of this question was to evaluate the time to completion of the degree for any anomalies in completing degree requirements. Analysis of this data did not find any anomalies.

Question 21 asked the respondents if they transferred into the IST program from a different program. Figure 4 below provides the results of this question:

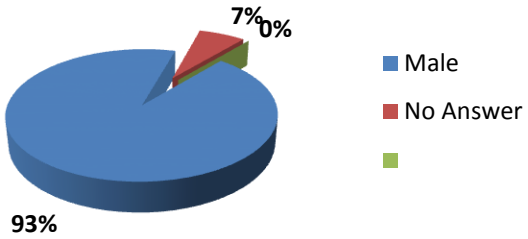

Figure 4: Percent of Students that transferred into the IST program

Respondents were then asked "*What program did you transfer from?*" Twenty-nine or 54.72% provided a response to this question. Twenty-four or 45.28% did not provide an answer. For the "Yes" answers provided, Table 7 below provides the responses for where students transferred from (*with count*):

Transfer Program	Count
Community College IT/IS Associates	6
Computer Science	4
Computer Engineering	3
Workforce with classes	3
Telecommunications	2
Communication Design	1
Engineering	1
Pre-Physical Therapy	1
Electrical Engineering	1
Education	1
Accounting	1
School of Art and Design	1
Basic Studies	1
Pre-Major	1
Electronic Systems Technology	1
Communication Design	1
No Response	1

Table 7: Count of Transfers

Respondents were further asked "*Why did they transfer to the IST program*?" Table 8 below provides the responses to this question (*respondents were asked to check all that apply*).

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Reason	Count	Percentage
IT related classes in HS/College	7	13.21%
Know someone in the IT industry	7	13.21%
Worked with IT before	8	15.09%
Changing Careers	8	15.09%
Interested in the field	21	39.62%
Want to make money	9	16.98%
Want to learn more to help with a current job	2	3.77%
Previous Major Requirements	3	5.66%

Table 8: Reason for transferring to the IST program

Additionally the survey asked if the respondents have or currently are participating in any IT related extracurricular activities. Four or 7.55% responded that they attended guest speaker lectures, 6 or 11.32% responded that they have participated in workshops, 10 or 18.87% stated they have attended job fairs, 11 or 20.75% of the respondents stated that they are involved in student organizations/clubs, and 29 or 54.72% stated "Other". Of the responses provided in the "Other" category, all 29 of the respondents stated that they are not involved in any IT related extracurricular activities.

Question 23 of the survey requested information from the respondents concerning what skills they have acquired while enrolled in the IST program and which of the listed skills have assisted them in IT related tasks. Table 9 below provides the responses to the selected list of skills (*respondents were asked to check all that apply*). It shows that the highest skill sets acquired in the IST program as reported by the respondents include: Programming, Troubleshooting and Networking, equally, Systems Analysis, and Database Management. Responses in the "Other" category include: IT Management, Team Management, and Desktop Publishing.

Skill	Count	Percentage
Troubleshooting	29	54.72%
Programming	34	64.15%
Database Management	23	43.40%
Systems Analysis	27	50.94%
Consulting	5	9.43%
Web Design	14	26.42%
Web Development	8	15.09%
Networking	29	54.72%
Information Security	19	35.85%
Other	6	11.32%

Table 9: Skills acquires in the IST program

As a follow-up to the previous question above, respondents were asked "*What IT skills did you need in the work place that you did not find in this program or at this university*?" Six of the respondents stated that they are unsure at the time this survey was taken, 13 of the respondents stated "none", 8 respondents identified additional skills in programming, mobile applications and comprehensive VoIP, data integration, IT related curriculum to transportation and health care, IT forensics, Linux servers, and OS and software upgrades. Two respondents stated that there needs to be additional emphasis on "soft skills" such as, social skills and dealing with people. All other respondents felt the curriculum required minimal to no changes.

Questions 25 and 26 addressed whether the IST program prepares students to find a job in the IT field and have the students received enough information concerning potential careers in the IT profession. Both questions were developed using a 5-point Likert-type scale where responses include: Strongly disagree, Disagree, Neither agree nor disagree, Agree, and Strongly agree as choices. Table 10 and Table 11 below provide the responses to these questions.

Response	Count	Percentage
Strongly disagree	5	9.43%
Disagree	10	18.87%
Neither agree nor disagree	8	15.09%
Agree	17	32.08%
Strongly agree	7	13.21%
No answer	6	11.32%

Table 10: Received enough information about potential IT careers

Response	Count	Percentage
Strongly disagree	1	1.89%
Disagree	4	7.55%
Neither agree nor disagree	6	11.32%
Agree	27	50.94%
Strongly agree	9	16.98%
No answer	6	11.32%

Table 11: IST program prepared you for a job in the IT field

Excluding the "no answers", approximately 45.29% of the respondents either agreed or strongly agreed that they received enough information about potential IT careers, versus approximately 28.3% either disagreed or strongly disagreed that they had received adequate information about IT careers. Of the

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respondents to this question 15.09% responded to neither agree nor disagree.

For the question as to whether the IST program has prepared individuals for jobs in the IT field, approximately 9.44% of the respondents either disagreed or strongly disagreed that the IST program has prepared them for a job in the IT field, versus 67.92% of respondents either agreed or strongly agreed that the IST program is preparing them for employment in the IT field. Of the respondents to this question 11.32% responded to neither agree nor disagree.

As a final question to this survey, respondents were asked how they are financing their education. Responses to this question are provided below in Table 12 (*respondents were asked to check all that apply*). The data shows that for this cohort of respondents, the vast majority of the combination in financing their education comes from State and/or Federal support, Scholarships/Grants, and Student Loans. A large percentage is "paying out of pocket" including parental assistance. Those that provided "Other" responses included: military tuition assistance and employer provided tuition assistance.

Method	Count	Percentage
Family Assistance (Parents)	14	26.42%
State/Federal Financial Support	25	47.17%
Scholarships/Grants	20	37.74%
Student Loans	32	60.38%
Out of Pocket	17	32.08%
Other	5	9.43%

Table 12: How are you paying for your education?

5. DISCUSSION

This study identified a significant disproportion in male and female gender pursuing a degree in applied IS/IT. Approximately 77% of the respondents were male and only 17% of the respondents reporting identified themselves as female. While Aud et al's study (2012) supports our findings, Hussar & Bailey's (2011, p. 21) study presents a projection that the number of enrollment will increase 8% for men and 16% for women between 2009 and 2020. Future recruiting of female students needs to be addressed at both the High School and transfer student (Community College) level when marketing applied IS/IT degree programs.

Forty-two (42%) of the respondents reported that their age was 24 or greater, thus identifying high-level of non-traditional students seeking a Bachelor of Science degree in IS/IT. Being a four-year degree program and with the present economic employment conditions in U.S., it is likely that more non-traditional students are seeking higher education degrees for mobility and increased advancement in their professions. In fact, according to Hussar & Bailey (2011, p. 21) the number of enrollments in postgraduate degree-granting institutions between 2009 and 2020 is projected to increase 21% for students that are 25 to 34 years old, and 16% for students of age 35 or older.

The increasing number of non-traditional students will require institutions to revisit their education practices and will trigger the need for innovative ways for delivering curricular and extra-curricular activities both in and out of the classroom settings to accommodate the student's work, education and life balance.

Approximately 64% of the respondents reported that they were working anywhere from 10 to greater than 40 hours per week while trying to achieve their degree. As noted in Table 4, the vast majority of reasons for why a student needed to work while attending school included (ranked by count in decreasing order): 1) Living Expenses, 2) School Supplies, 3) Social Events, 4) Clothing, 5) Phone/Computer, 6) Tuition, 7) Vehicles, 8) Support of Family Members, 9) Other reasons, and 10) Travel/Vacation. Although tuition ranked 6th by the number of counts, living expenses and school supplies account for a significant number of responses (counts) as a major reason for working while attending school.

For many students working is not optional, but a necessity, especially when they are the primary source of income for their families or when they have to finance their education by paying out of pocket. Working students is already a reality in many classrooms and can impact how instructors and institutions offer academic activities. Bosworth (2007) cautions that "employees who study were at particular risk of leaving postsecondary education in their very first year" (p.13).

Approximately 54% of the students in this cohort transferred from another degree program which may suggest that they were not introduced to the applications/opportunities of

the IS/IT field prior to enrolling into an educational program at a university. The data shows that the vast majority of the respondents chose to transfer to the IST program from another educational program or industry due to their interest in the field of IT. However, one of the lowest reasons for transfer was due to previous major requirements.

Approximately 68% of the respondents in this cohort felt that the skills/education they have received at the time of this survey prepares them for employment in the IT field/profession. Yet, 8 respondents identified additional IT skills that they did not find in the program or at the university. These skills could be incorporated into the existing courses or could be taught as extra-curricular activities. However, the activities should be carefully planned to take into consideration the increasing number of non-traditional and working students (e.g., remote, asynchrony and self-paced activities).

Every semester students have the opportunity to learn more about the IT field by attending guest lectures, career fairs, and panel discussions with representatives of technology companies, or by simple talking with faculty or academic advisors. Despite all the opportunities available, 28% of the respondents disagree that they have received enough information about potential IT careers. In addition, almost 55% of the respondents reported not being involved in any IT related extra-curricular activities. This situation raises an important issue of engaging students in learning activities beyond the classroom settings. However, it would require further investigation to identify the main factors for such disregard.

Based on the present curricula evaluated by students in this program, 68% of the respondents believed the IST degree program was preparing them for employment in the IT/IS field. Further, respondents in this study were asked "what changes would you make to the program to better prepare yourself for the IT job market?" Respondents suggested that the curriculum keep up with the changes in technology, more hands-on labs, and continue to update the hardware and software applications.

Presently, the average total cost of an undergraduate public 4-year degree which includes housing, tuition, fees, books, supplies, and other expenses is $20,100 (Aud et al, 2012, p.98). In working towards degree attainment and the cost of a 4-year degree, our study identified that approximately 64% of the students responding to this survey reported working between 10 and greater than 40 hours per week while attending college. Aud et al's study (2012) supports our findings, in that, their study reported for full-time college students, approximately 17% of college students worked less than 20 hours per week, approximately 17% worked between 20 – 34 hours per week and approximately 6% worked 35 hours or more in 2010, respectively (p. 93). Further, our study reported that of the expenditures and costs students are facing to attain a degree, the largest reasons for working while attending college included paying for tuition, school supplies, and living expenses (see Table 4).

Additionally, a large amount of respondents in our study reported that they were financing their degrees through State and/or Federal assistance, student loans, and paying out of pocket. With the rising costs of a public 4-year degree, first-time undergraduate students receiving financial aid has increased from 75% to 85% from 2006 to 2010 (Aud et al, 2012, p. 100). Thus, for the relatively high percentage (42%) of non-traditional students identified in this study, the costs of degree attainment and balancing home life, work, and pursuing an education may have its trade-offs, more so, extending the time to degree completion.

During the analysis of the survey data, we identified some variables that would help the discussion of education for non-traditional and working students. The first was the failure to ask the cohort of this study their Ethnicity, and the second was not asking about Housing (e.g., living in the dormitory halls, renting or owning a place). In addition, as there were respondents who stated that they would not pursue an IT related job after graduating, the survey should have a follow-up question to help identify the reasons for not continuing in IT the field.

Brown (2002) developed seven strategies to contribute to a nontraditional student's development and persistence. These strategies include:

- Recognizing the unique characteristics of the nontraditional student;
- Establish a number of services to meet the needs of nontraditional students;

- Empower professional student services to advise these students in various types of educational backgrounds;
- Employ, for the purpose of recruiting and pre-enrollment student services that assist in setting realistic goals;
- Develop orientation and first-year experiences that empower the students to manage the culture of higher education;
- Design career counseling and directed internships, service learning, and volunteer experiences; and
- Encourage faculty members who teach in nontraditional settings to develop inclusive learning environments (Brown, 2002, pp. 72 – 74).

6. CONCLUSION

With the increasing amount of nontraditional students entering technical degree programs, curriculum design and program educational activities will require re-evaluation for student access. Many students may not be able to participate in educational activities beyond the regular classroom settings because of restrictions of their work-life-education balance. Students may even struggle to find time for the expected academic activities such as to study the material, complete homework assignments or meet for team work.

As cited by Brown (2002), this cohort of student's make up at least 50% of enrollments continues to grow in higher education. With this cohort, comes a myriad of variables that can unfortunately lead to a student's attrition in completing their educational goals. These variables include (*not all inclusive*): supporting a family, working greater than 30 hours a week, financially being able to obtain a degree in reasonable amount of time, and balancing these responsibilities with coursework.

In a longitudal study (Horn, 1996) of nontraditional undergraduate students' persistence and attainment in postsecondary education, the author states that intervention, assistance, and providing support to nontraditional students has to take place within their first year of college. As a comparison to more traditional students, one in three nontraditional students stopped attending school and left without a credential in their first year versus one in five for traditional students.

With the data from this study identifying the lack of participation of nontraditional students involved in extra-curricular program activities and with the growing number of nontraditional students in higher education, it is imperative upon staff and faculty to develop and provide a stronger and more inclusive learning environment for nontraditional students.

The results of this survey identified opportunities to improve the students learning while taking into consideration their work-life-education balance. For example, the use of podcasts would allow students to listen important topics while driving to and from work or doing other activities. When representatives from companies are invited to speak with students, we should record the presentations or, if possible, make it available in a synchronous mode so students that cannot attend the presentation can still participate in the discussions. Another issue to be addresses is that lab equipment is not available outside of the school environment. However, several technologies can be used to remotely connect to the lab equipment or to simulate them, such as NetLab++ and IBM Academic Skills Cloud. In addition, this research shows that 39.62% of participants did not hold an IT related job and 26.42% held only one IT job while attending school. As many students need to work, we could help them to find IT related jobs that will contribute to their experience learning IT skills beyond the classroom environment. For example, students could rotate jobs to be exposed to different technologies and IT activities.

As the non-traditional becomes the new traditional, we should consider blending pedagogy with andragogy to better serve the future student population and to accommodate their work-education-life balance.

7. ACKNOWLEDGEMENT

The authors are grateful to the student Zachary Sullens for his support designing and preparing the survey and to the SIU Academic Scholarship Office for funding the Undergraduate Assistantship (UGA) Program.

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