

Reassessing the Skills Required of Graduates of an Information Systems Program: An Updated Analysis

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Abstract

The study involves an updated analysis of the job characteristics of information systems graduates based on the status of the job market as well as the perceptions of 72 graduates from an information systems program of a Midwestern university. Approximately one-third of the graduates were working in positions related to technical support. Providing end-user support, installing software, managing information, and installing and maintaining computer devices/components were the top four tasks performed by the largest number of graduates. Other aspects of the graduates' jobs were similar to national trends and most felt adequately prepared based on their coursework.

Keywords: information systems (IS), information technology (IT), IS graduates, IS graduate survey demographics, and IS/IT labor market employment outlook

1. INTRODUCTION

The fast-paced advance of technology continually reshapes the workplace and motivates educators to improve curriculum. One of the main educational goals is preparing graduates for the workplace. This is due in part to the constantly evolving IT landscape with its emerging technologies and advanced business computer systems. As the field continues to change and evolve at an incredibly fast pace, faculty knowledge of the most current workforce

needs is paramount. It is essential not only to identify these newly required positions, but also the specific tasks and responsibilities needed for each of these new jobs. This also requires educators to modify and update their curriculum and instruction regularly so that their students acquire the skills and knowledge requisite to performing these tasks in the current workplace.

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.

In an attempt to analyze the skills needed and the job market of the next few years, many in the IT field use surveys or interviews to gather feedback from business professionals. Atkinson and Andes (2010), provide additional support to the growing employment in the IS/IT professions. The authors argue that even though offshoring has caused a decrease in IT jobs from 1998 to 2008 (programming jobs have declined by 25 percent over the last decade, a loss of 134,000 jobs, presumably much due to offshoring), two kinds of IT jobs have grown. These include:

" IT workers have to be onsite or nearby – jobs such as network administrators and computer support specialists, adding roughly 147,000 and 106,000 jobs respectively. Likewise, Network Systems and Data Communications Analysts jobs grew from 98,000 in 1999 to over 230,000 in 2008, or 134 percent. The second kind are jobs that are higher skilled and hence harder to be moved to low wage nations. For example, computer engineer, software and application engineering jobs paid 25 percent more than the average IT job and 27 percent more than computer programmers and grew by over 400,000 during this period. Likewise, research computer scientists, who pay the most of any IT occupation, also grew, albeit not as fast." (Atkinson & Andes, 2010, pp. 1 - 2).

Studies like these help educators stay current and manage content in the classroom in order to incorporate valuable information on current threats, challenges, and opportunities students will face as graduates of IS programs. Some educators also survey graduates to identify skill sets performed in the workplace. Surveys of graduates, along with analysis of perceptions of which skills are most important, contribute to validating classroom content. This information can be used by faculty to help them revise and improve curricula and better prepare students for the changing workplace.

2. PURPOSE AND RESEARCH QUESTIONS

This updated study elaborates on workplace experiences gathered from graduates of an IS program at a Midwestern university. Specifically, the purpose was to identify the types of jobs and tasks performed by the graduates, to identify

their perceptions regarding the importance of various skills in the curriculum, and to compare the status of males and females in such areas as time taken to obtain employment, salaries, primary job focus, and perceptions of importance of various technical and nontechnical skills.

Analysis of this type of data can contribute to improvement in the performance of an IS curriculum. Post-graduation surveys are an effective means to evaluate the value of education gained. Such surveys can also assess institutional excellence, providing valuable feedback on graduates' experiences in the workplace and how higher education impacted the students' experience (Andero, 2000). Graduates who have completed a program are often able to evaluate its effectiveness and make comments regarding content areas to be included in the curriculum once they are in the workforce.

The research questions were:

1. On average, how much time do graduates spend obtaining positions after graduation, and is there a significant difference between males and females in the time taken?
2. What are the salaries of the graduates' first information systems jobs, and is there a difference in salaries between males and females?
3. What are the main areas of job focus (career fields) of the graduates, and is there a difference between males and females?
4. What are the main types of tasks that the graduates perform on a regular basis, and are there a difference between males and females?
5. How well did the IST curriculum prepare graduates for their present employment?

This paper reports on the overall responses of the graduates; the analysis of gender differences is part of another study.

3. REVIEW OF THE LITERATURE

Labor Market, Industry Trends, and Projected IT Outlook

The recent recession of 2007 through 2009 significantly affected the U.S. economy, labor market, and every sector of business and industry. By January 2010, job losses were at their lowest point totaling approximately 8.8

million in losses (Goodman & Mance, 2011). Among one of the industry sectors affected, is the sector of information (this sector includes occupations in the information and communication technology fields), which according to Goodman and Mance (2011), experienced their largest sustained job losses on record (p. 7).

The good news is that the projections for the U.S. labor market and economy have been improving since its stabilization in 2010 with strong employment outlooks in the information sector. According to Henderson (2012), the U.S. industry employment outlook and projections through 2020 state that the information sector "is projected to have the fastest growth rate in real output for all major industry sectors, increasing from nearly \$1.2 trillion in 2010 to almost \$1.9 trillion in 2020," (p. 68). These projections are further supported by the U.S. Bureau of Labor Statistics' (BLS) *2010-2020 Occupational Outlook Handbook* for computer and information technology occupations. Additionally, the BLS has projected an increase of 22% employment for all computer related occupations from 2010 through 2020 as compared to a 14% increase in all other occupation.

Further the BLS's *2010-2020 Occupational Outlook Handbook* (2012) for computer and information technology occupations identifies eight occupational categories and their respective occupational growth. These occupations include:

- Computer and information research scientists
- Computer programmers
- Computer support specialists
- Computer systems analysts
- Database administrators
- Information security analysts, web developers, and computer network architects
- Network and computer systems administrators
- Software developers

As identified in Figure 1 (Appendix), data from the BLS shows that all computer and information technology occupations will outperform "all occupations" in growth through 2020. Additionally, the data identified the following percent growth through 2020 in each of the following occupational categories: software developers-apps 28%, software developers-

systems 32%, software developers 28%, network and computer systems administrators 28%, information security analyst, web developers and computer network architects 22%, database administrators 31%, computer systems analysts 22%, computer support specialists 18%, and computer and information research scientists 19%. The decline in employment in the category of computer programmers (12% growth versus "all occupations" growth of 14% and all computer occupations of 22%) may be supported by Atkinson and Andes's (2010) discussions relating to this occupations argument due to offshoring.

IT Employment Demographics by Gender, Occupation, and Salaries

In the U.S. Department of Labor's (2010) report, *Women in the labor force: A databook*, the percentage of women employed in the professional and related occupations category showed that women hold 57.5% of the jobs in this category. This category further includes sub-categories in the computer and mathematics occupations. The computer sub-categories include: computer scientists and systems analysts, computer programmers, computer software engineers, computer support specialists, database administrators, network and computer administrators, and network systems and data communications analysts. Of these sub-categories, the following percent employment by women were provided: computer scientists and systems analysts, 26.9%; computer programmers, 20.2%; computer software engineers, 20.2%; computer support specialists, 26.7%; database administrators, 35.3%; network and computer administrators, 22.3%; and, network systems and data communications analysts, 24.7%.

Additionally, this report stated that women working in 1979 earned approximately 62% of what men did versus 80% in 2009. The most recent data for women-to-men earnings peaked at 81% in 2005 to 2006, slightly down to 80% in 2007, where it currently remains through 2009. Further in 2009, women accounted for 51% of all employed individuals in the management, professional, and related occupations (p. 1).

Thibodeau (2008), in an article published on *Computerworld.com*, states that men are making approximately 12% more in earnings than women in the tech fields. Further referencing a survey performed by Dice.com, the

survey found that earnings for men increased by 2.7% in 2007 as compared to a flat women's earnings. The average salary for men during this survey in was \$76,582, versus \$67,507 for women in the same position.

Further, the BLS's *2010-2020 Occupational Outlook Handbook* (2012) for the computer and information technology occupations states that the 2010 median salaries for the 8 occupational categories listed above are: software developers - \$90,530; network and computer systems administrators - \$69,160; information security analyst, web developers and computer network architects - \$75,660; database administrators - \$73,490; computer systems analysts - \$77,740; computer support specialists - \$46,260; computer programmers - \$71,380; and, computer and information research scientists - \$100,660, respectively.

IT Skills: 2012 and Beyond

Technical IT skills

From a survey of 353 IT executives, Sala (2011) found that the following IT skills are presently in demand. These technical skills (ranked in order of hiring percentage) for 2012 include (a) programming and application development, (b) project management, (c) help desk/technical support, (d) networking, (e) business intelligence, (f) data center operations, (g) Web 2.0, (h) security, and (i) telecommunications.

Additionally, in an international study performed by CompTIA (2012) of 1,061 IT and business managers involved in managing IT or IT staff within their organizations, the authors classify 3 objectives the study. The overall goal of the study was to gain a better understanding of the IT skills in demand and identify any existing or forthcoming IT skills in shortage. The stated objectives were: (1) identify which IT skills are and will be most important to employers, (2) determine how well IT skills align with current/future needs of employers, and (3) examine professional development practices (p. 1).

The study identified 15 technical skills from the respondents that are considered the top priorities in IT for 2012. These following technical skills listed below are in order of percent importance tabulated from all respondents:

- Cybersecurity (88%),
- Data storage/back-up (88%),

- Updating aging computers/software for staff (82%),
- Network infrastructure (82%),
- Disaster recovery/business continuity planning (81%),
- Automating business process through technology (73%),
- Mobility (66%),
- Web/online presence, including e-commerce (64%),
- Collaboration (63%),
- Telecommunications (62%),
- Virtualization (61%),
- Business intelligence/data analytics and mining (59%)
- Cloud computing (50%),
- Social networking technologies (41%), and
- Green IT (38%) (CompTIA, 2012, p.5).

Additionally, in an article published on *CIO.com*, Levinson (2012), states that research from 2 different IT firms suggests that there are 14 different IT skill sets and sub-skill sets in demand for 2012 identified by research performed by Bluewolf. These skill sets and sub-skill sets included:

- *Mobile application development*: HTML5, iPhone/iPad, Android, JavaScript, and UI design.
- *Cloud computing*: Elouqa, Marketo, Salesforce, Google Apps, and Amazon Web Service - Elastic Compute Cloud (EC2).
- *Big Data*; MySQL, HBase, Cognos, and Informatica

Although the insights/studies and company analyses listed above cover a variety of IT businesses, it is obvious that there is a very wide variety and/or disparity in IT skills needs based solely on the type of companies researched. In summary, the study identified for those companies surveyed, that their IT "technical" skills gaps concerns included: database/information management, networks/infrastructure, server/data center management, security/cybersecurity, helpdesk/IT support, data analytics/business intelligence, web design/development, application development/programming, virtualization, storage/data back-up, and cloud computing - IaaS or PaaS.

Non-technical (Soft) IT Skills

According to the BLS's *2010-2020 Occupational Outlook Handbook* (2012) concerning IT "soft" skills in the workforce, the handbook identified

the following *soft skills* related to the 8 major categories under the computer and information technology occupations. These soft skill sets for each of the categories are:

- *Computer and Information Research Scientists*: analytical, communications, critical-thinking, ingenuity, detail-oriented, and logical thinking skills.
- *Computer programmers*: analytical, concentration, and detail-oriented skills.
- *Computer support specialist*: interpersonal, listening, problem-solving, speaking, and writing skills.
- *Computer systems analysts*: analytical, communication, creativity, and teamwork skills.
- *Database administrators*: analytical, communication, detail-oriented, logical thinking, and problem-solving skills.
- *Information security analysts, web developers, and network architects*: analytical, concentration, creativity, customer service, detail-oriented, ingenuity, leadership, organizational, problem-solving, and teamwork skills.
- *Network and computer systems administrators*: analytical, communication, computer, multi-tasking, and problem-solving skills.
- *Software developers*: analytical, communication, creativity, customer service, detail-oriented, problem-solving, teamwork, and technical skills.

Further, CompTIA's (2012) research provided additional insights from its study of the 1,061 IT and business managers involved in managing IT or IT staff within their organizations and their expectations on what "soft skills" are needed in the IT profession. These soft skills include (by respondent rank of percent very important): (a) strong work ethic (71%), (b) motivation and initiative (67%), (c) customer service (65%), (d) flexibility and adaptability (64%), (e) innovation and creative problem solving (63%), (f) analytical skills (61%), teamwork (60%), verbal and written communication (59%), and project management (47%).

In a past report published by the Boston Advanced Technological Education Connections (BATEC, 2007) in collaboration with research through the National Science Foundation (NSF) and the University of Massachusetts relating to "soft skills" in the IT professions, a regional survey of 68 IT and Information and Communication Technology (ICT) employers

stated that the most significant "soft skills" needed of IT personnel should include: (a) communication skills (verbal aptitude), (b) problem solving skills (especially problem definition), (c) greater facility with teamwork and collaboration, (d) ability to manage and motivate one's self, and (e) contextual knowledge of the work - Why, Whom, and When.

It is interesting in comparing the regional study in 2007 to both the most recent studies internationally and through the U.S. BLS in evaluation of soft skills in the IT profession and beyond. There is little variance in the fact, that even though we are a digital age, there is still a need for the human interface to ensure communication and technical success in IT endeavors.

Educational Demographics in IT

The U.S. Department of Education, National Center for Education Statistics (2011a) reported for the 2009 to 2010 academic year, 32,466 associate's degrees were conferred, 39,589 bachelor's degrees were conferred, and 17,953 master's degrees were conferred in the computer and information sciences disciplines from all educational institutions (public, private for-profit, and private not-for-profit). In an additional report published by the U.S. Department of Education, National Center for Education Statistics (2011b) for the 2009 to 2010 academic year further data on the ethnicity of graduates with bachelor's degrees conferred in the computer and information sciences were provided. Of the ethnicity data identified in this report, 26,565 (67%) were White, 4,565 (12%) were Black/African American, 2,942 (7%) were Hispanic, 3,372 (9%) were Asian/Pacific Islander, 279 (< 1%) were American Indian/Alaska Native, and 1,866 (5%) were Non-resident alien.

Further in another report provided by the U.S. Department of Education, National Center for Education Statistics (2011c) stated that a total of 39,589 bachelor's degrees were conferred in the computer and information sciences disciplines during 2009 to 2010. Of this total, 32,410 (82%) degrees were obtained by men versus only 7,179 (18%) women. Additionally, the data provided for master's level degrees for this same period, showed a total of 17,953 degrees were conferred. Of this total, 13,017

(73%) degrees were obtained by men versus 4,936 (27%) degrees conferred by women.

The data provided above for conferred bachelor's degrees between men and women also provided a percent change in degree obtainment by gender from academic years 2004 to 2005 through 2009 to 2010. Degrees conferred by women in this category for the 2004 to 2005 academic year were 11,986. As stated above, degrees conferred by women in the 2009 to 2010 academic year were 7,719. This is a negative percent change of approximately 40% over 6 years. Additionally, men also saw a negative percent change across this same period, but at almost half of the loss (-23%) in degrees conferred. Peak degrees conferred in this field of study occurred for women in the 2002 to 2003 academic year with a total of 15,483 degrees conferred. Likewise for men, the peak academic year and number of degrees conferred was 2003 to 2004 and 44,585, respectively.

It was unclear from these reports why a decline in degree completion has happened over this period. One possible reason for the decline of males and females entering into an educational environment and specifically this field of study during this period may have been the recession and its impact on the information sector as previously discussed by Goodman and Mance (2011).

Additionally, the BLS's *2010-2020 Occupational Outlook Handbook* (2012) for the computer and information technology occupations states that of all 8 of the categories listed, 6 of these categories require a bachelor's degree. These occupations include: software developers, network and computer systems administrators, information security analyst, web developers and computer network architects, database administrators, computer systems analysts, and computer programmers. The occupation of computer support specialists states that the educational requirements are "some college, no degree." Most of these individuals have acquired an associate's degree in a computer related field, and then further their training and development through certifications and/or company specific training. Of all the educational requirements discussed above, only the occupation of computer and research scientist requires further education at the doctorate or professional level. Although, per the discussion in the *2010-2020 Occupational Outlook*

Handbook regarding this occupation, some government jobs in this occupation may only require a bachelor's degree.

4. METHODS

Every other year beginning in 2001, a follow-up study of the graduates of an information systems and technologies degree at a Midwestern university was conducted. The survey was designed based on a review of the literature and the curriculum proposed by the Organizational Systems Research Association (Hunt, 2004). A panel of expert's pilot tested and reviewed it; revisions were made based on the feedback. For each of the studies (conducted in 2001, 2003, and 2005) the survey and cover letter were sent to the Human Subjects Review Board for approval. The study involved e-mailing a cover letter, and survey, to all students who graduated in the previous two year period. In 2001, the 1999-2000 graduates were surveyed with a return rate of 57%. In 2003, the 2001-2002 graduates were surveyed with a 62% return rate, and the 2003-2004 graduates were surveyed in 2005 with a 46% return rate. It is important to note that this included all of the graduates of this degree program. Originally, it was a two year office systems program; in 1997, this program was expanded into a four year information systems and technologies degree with the first students graduating in 1999. The survey was designed to identify the time it took to get the first job, the entry-level salary, the tasks and responsibilities of the graduates on their first information systems or information technology job, as well as their perceptions of the various skills they felt should be included in the curriculum.

A follow-up survey for IST graduates, Information System Technologies Survey, was used to collect data. The survey consists of 29 questions related to post-graduate educational and work experience as well as IST curriculum. The link to the survey was sent via e-mail to Midwestern university IST graduates (57% return rate) through Limesurvey and responses from participants were saved in Excel and SPSS. The total number of respondents to the survey was 72 with 60 male respondents (83.3%), 9 female respondents (12.5%), and 3 unidentified. The statistical software used for data analysis was SPSS.

The purpose of this study was to (a) provide demographic information on IST graduates, (b)

provide information on how long it took to find the first job, the entry-level salary, and how well 2010 and 2011 graduates think IST curriculum helped them prepare for their jobs, and (c) identify what tasks are more frequently performed in IST jobs and the primary focus of their jobs.

The survey includes 2 demographic questions, one Likert-scale question on how well graduates feel the IST curriculum prepared them for their jobs, two open-ended questions, and 21 multiple-choice questions. To answer previous research questions, we analyzed question 1 and 2 for demographic information, question 13 for how long it took to get the first job, question 15 for salary information, question 12 for how well the graduates feel IST curriculum prepared for their jobs, and question 17 and 18 for identifying most frequently performed tasks and primary focus of their jobs.

5. FINDINGS

Demographic Information

Figure 2 below shows that of the 72 respondents, approximately 60 were male (83.3%), 6 were female (12.5%), and 6 did not identify their gender.

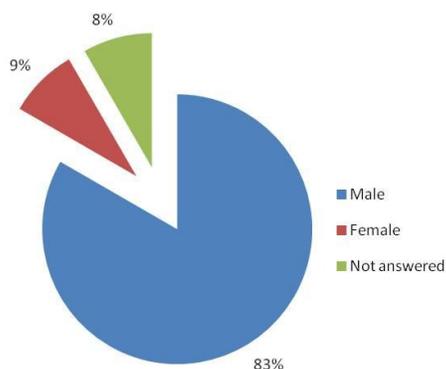


Figure 2. Survey Gender Demographics

Of the 72 respondents asked about their ethnicity, 61 of the respondents identified themselves as Caucasian (84.7%), 3 as Asian-American (4.2%), 1 as African-American (1.4%), 2 as other (2.8%), and 5 (6.9%) did not provide an answer. Figure 3 below provides the distribution of respondent's ethnicity responses:

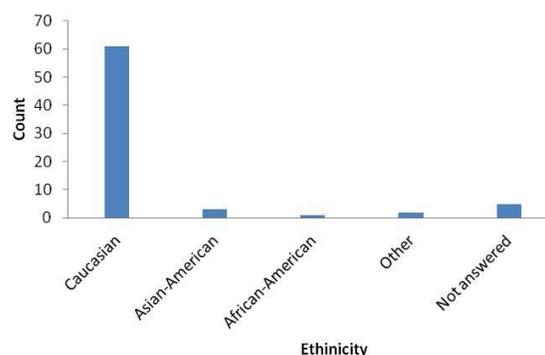


Figure 3. Survey Ethnicity Demographics

Research Question 1: Time Taken to Obtain the First Job

This survey further asked "How long did it take you to get your first IST-related job?" Of the 59 individuals who responded, 18.6% said they were employed prior to graduation, 13.6% indicated they had an offer prior to graduation, 30.5% stated they found a job in less than three months, 22% said they found a job in more than three months and less than six months, and 8.6% indicated they were employed after 6 months. Almost 85% of the graduates in this survey were employed within six months of graduation.

Research Question 2: Salary

Fifty-six of the respondents provided answers relating to their salary range. Of those respondents, 23.2% indicated they earned less than \$30,000 and 46.4% said they earned more than \$40,000. 25% of the graduates make more than \$50,000. Generally speaking, salary distribution is very balanced in every range (the data shows that the responses identify a relatively close uniform distribution).

Research Question 3: Job Primary Focus

Respondents were asked to identify their primary job focus in which there are 10 categories of primary job focus. Of the 57 respondents to this question, each respondent was only allowed to pick one primary job focus. Twenty-six percent of the respondents identified Networking as the highest percentage of their job focus. Approximately twenty-one percent chose Other as their job focus with 0% choosing E-commerce as their job focus. Table 1 below provides a complete breakdown of responses to this question by number and percent:

Table 1

<i>Primary Job Focus</i>		
	Frequency	Percent
Job Focus	n	%
Networking	14	24.6
Other	12	21.1
Technical/end user support	10	17.5
Information management	7	12.3
Information security management	5	8.8
Database design/development	4	7.0
Web design/development	2	3.5
Project management	2	3.5
Computer programming	1	1.8
E-commerce	0	0
Total	57	100

Research Question 4: Tasks Performed

The participants were asked to choose what type of job tasks they regularly performed in question 18 in which there are 20 categories of tasks. The respondents could pick all that applied and 71 participants completed the question. The mostly frequently picked task was providing technical/end-user support and it was picked by 33 participants. The least frequently picked task was developing e-commerce applications and it was picked only once. Table 2 below provides a complete breakdown of responses to this question:

The respondents evaluated how well the IST curriculum prepared them for their jobs in question 12. The question is measured in Likerscale from 1 to 5 in which 1 represents "not at all prepared", 2 represents "not well prepared", 3 represents "somewhat prepared", 4 represents "well prepared", and 5 represents "very well prepared". The higher the value, the better that the IST curriculum prepared them for their jobs. The graduates were asked to rate question 12 from 1 to 5 and 65 graduates responded to the question. The mean of 3.54 indicated that graduates rated how well IST curriculum prepared them for their jobs between "somewhat prepared" and "well prepared".

Table 2

<i>Task Performed</i>	Frequency
Providing technical/end-user support	33
Maintaining/troubleshooting networks	32
Analyzing systems	27
Managing information	26
Setting up/configuring LANs	24
Maintaining accounts	24
Installing software	24
Installing/maintaining computer devices	19
Developing/redesigning systems	19
Configuring/maintaining WANs	15
Monitoring security systems	15
Maintaining databases	14
Maintaining web pages	12
Other	12
Customizing computer programs	10
Installing security systems	10
Writing computer programs	9
Creating web pages	9
Designing databases	8
Developing e-commerce applications	1

Research Question 5: How Well IST Curriculum Prepared Graduates for Their Jobs

6. SUMMARY

To summarize the major findings of this study from 2010 and 2011 graduates:

1. Respondents were dominated by Caucasian (almost 85%) with underrepresented African-American (1.4%) and Asian (4.2%). There were no enrollments of Hispanics at all.
2. Almost 85% of the responding graduates found a job within six months after graduation and 46.4% are earning more than \$40,000 annually and another 25% are earning more than \$50,000 per year.
3. Networking and Technical/end-user support were among the top of primary job foci and E-commerce was at the bottom.
4. Providing technical/end-user support and Maintaining/troubleshooting networks were among the most frequently performed tasks

and Developing e-commerce applications was the least frequent.

5. The graduates rated the IST curriculum preparation for jobs between "somewhat prepared" and "well prepared".

7. CONCLUSION AND FUTURE RESEARCH

The demographics of our respondents were in line with the demographics trends in all computing sciences. For example, the annual Taulbee Survey (Zweben and Bizot, 2012) reports that of all undergraduate computer science degrees awarded in 2010-2011, 66.9% were earned by Caucasians and 88.3% were earned by men. Since 2011, IST graduates at this institution were predominately Caucasian (84.7%). As with the supporting data provided from the U.S. Department of Education National Center for Education Statistics (2011a) relating to a graduate's ethnicity, further research and analysis should be performed in order to identify what barriers are preventing minorities and women from entering the disciplines of IS and IT, and their respective professional fields.

Our findings related to salary show that the majority our graduates that responded to the survey are earning more than \$40,000 annually. This figure is considerably less than salaries reported by other studies and the BLS but it should be noted that the figures in the current study are from new or recent hires. The BLS reports mean salaries for occupations which take into consideration promotions and salary increases over time. The authors plan to collect data from less recent graduates to determine how well our graduates are keeping pace with salary increases compared to national averages.

The most common job focus was networking related. However, as shown in Table 1, there were positive responses to most of the other categories. This finding is in line with the BLS's projections for various categories of jobs. Since our curriculum offers network specialization, and that is a job in high demand, our findings align and that portion of the curriculum is appropriate.

The average rating for how well IST curriculum prepared the graduates for their jobs was 3.54 (the highest is 5) indicating there is some room for curriculum improvement. IST Educators should focus on those tasks more frequently performed so that graduates can better prepare themselves for their future jobs. This study can provide insight in curriculum delivery for

educators in the IST field in order to make decisions on IST curriculum design.

The most commonly reported job tasks in our study are also aligned with the BLS's projection of jobs in the computer support specialist category. It is obvious that the graduates are being hired into high-demand jobs, however, perhaps the most important question is how well were they prepared. The 3.54 rating indicates the graduates were fairly well prepared, but there is room for improvement. The next step in this research is to analyze the quantitative data submitted by the respondents to develop specific goals for the current curriculum.

Because the IS/IT field experiences rapid change, it is important for academics to be attuned to the needs of hiring organizations. Graduates of our programs can provide the most relative connection between what is needed and what is being provided. This type of research can be useful and insightful to faculty as they strive to keep curricula timely and relevant.

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Appendix

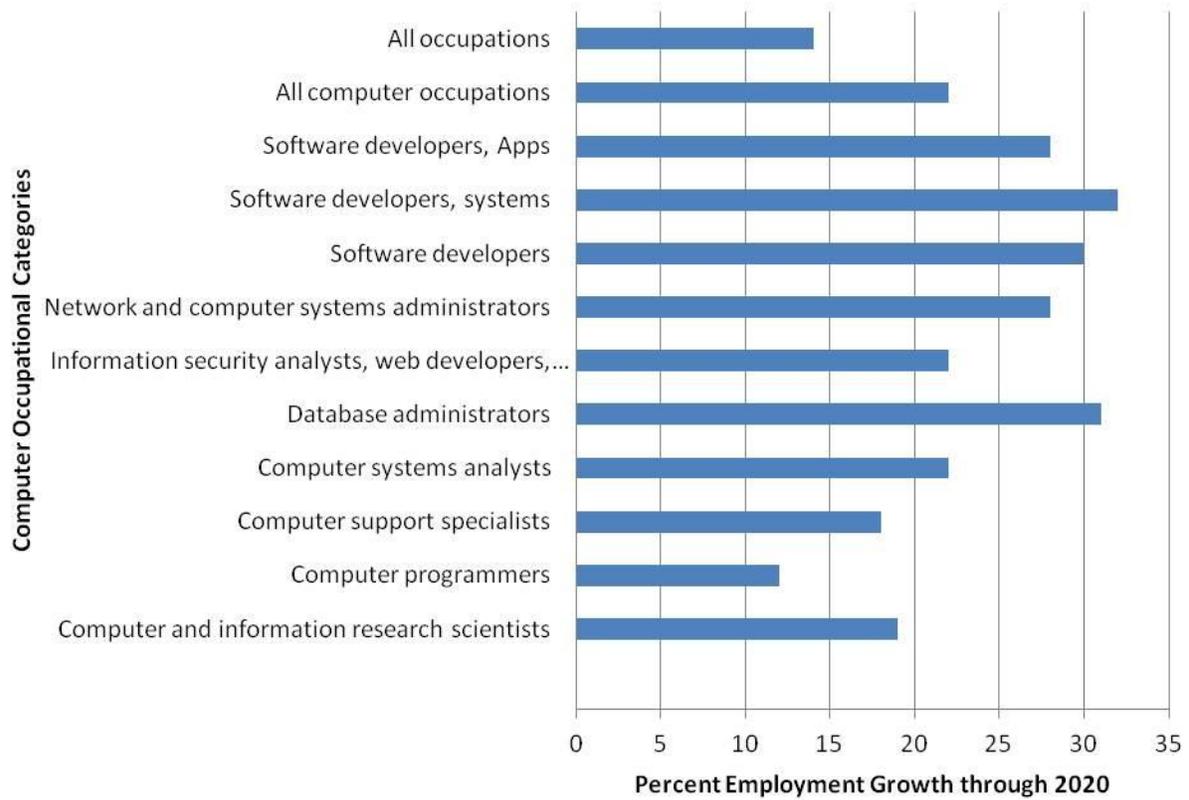


Figure 1. Comparison of computer and information occupational growth through 2020