

# Job Titles, Tasks, and Experiences of Information Systems and Technologies Graduates from a Midwestern University

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## ABSTRACT

This study identified the job titles, tasks, and experiences of recent graduates of an Information Systems Technologies (IST) program of a four-year university in the Midwest. The job title and major job focus of the largest number of respondents fell in the technical/end user support area. The six tasks performed the most by the graduates were (1) providing technical/end user support, (2) installing software, (3) installing/maintaining computer devices, (4) managing information, (5) analyzing systems, and (6) maintaining/troubleshooting networks. The respondents indicated that Microsoft Windows NT was the operating system used the most and SQL was the programming language used by the majority of the companies. The top skills required for a position in the IS or IT field, according to the graduates, were: thinking skills, desire to learn, and personal characteristics.

**Keywords:** Job titles and experiences of college graduates, IST curriculum, software used in business

## 1. INTRODUCTION

The field of information systems and technologies is constantly changing and bringing about challenges to educators due to the many technologies that are making an impact on end-user computing, networking, database management, e-commerce, information management, and other organizational business processes. These changes in the business environment are bringing about dramatic organizational redesign and reengineering and companies are continuing to invest in new technologies. Although business managers and IT managers have agreed in recent years that IT has had a direct, positive impact on the productivity of workers in almost every area of business in the U.S., economists have been slow to come to this conclusion. However, "a report published in early 2000 by the Federal Reserve pinpoints a dollar amount that IT has contributed to the economy over a five-year period. A forthcoming report from MIT goes further, suggesting investments made in IT several years ago are realizing their greatest return now" (McGee and Wilder, 2000, p. 42.) In fact, most agree that it is not just the information technologies, but also the reengineering of business practices that produce the greatest increases in productivity.

As we move into the 21st century, "a powerful convergence of technological, economic, and social

trends are altering the very nature of work" (Wagner, 2000, p. 2). With these rapid changes, educators are constantly challenged to stay current with the trends and systems utilized in business and industry in an attempt to keep curriculum up to date and to better prepare students for the changing workplace. Educators must constantly enhance the curriculum with new technologies, and at the same time, emphasize to students the importance of knowing how to learn and the idea that education is a lifelong process. The challenge facing educators involves identifying the trends, technologies, and systems, learning the skills and knowledge necessary to teach these technologies, and then incorporating them into the curriculum. It is essential to provide students with a broad background that includes not only technical skills but people skills as well, in order to get and maintain a job. All computer-related programs of study must constantly be evaluated and modified to remain abreast of the many changes, challenges, and trends occurring in the information systems environment and to offer a curriculum which encompasses the requirements of the current workforce. It is imperative that as information systems continue to evolve, educators must continue to develop and enhance curricula that will help students obtain and maintain jobs. In order to stay up to date with what is happening in the workplace, educators must be in constant contact with those in business and industry. This can be done

through advisory committees, job shadowing opportunities, and research studies that identify the systems and technologies used in the workplace.

## **2. PURPOSE OF THE STUDY**

The technological impact on business and industry continues to occur, and incorporating technology into the workforce broadens the scope of jobs and redefines responsibilities for workers. Workers must therefore be educated to meet the changing needs of the workforce. The proliferation of technology that has affected business and industry has impacted the educational arena as well. Educators must constantly identify the skills and knowledge required by business and industry in order to continue to update and enhance the curriculum. One way is to survey individuals in business and industry; another is to survey graduates who have been through the curriculum and then taken jobs in information systems and technologies. After the author conducted a national study in 2000 in which surveys were sent to members of the Association of Information Technology Professionals (AITP) to identify technical and non-technical skills required of graduates for a position in the IS or IT field, the author decided to conduct a study using a similar survey to identify job experiences of the first two years of graduates in a new four-year degree program entitled Information Systems Technologies. The purpose of this study was to gather information from recent graduates regarding their job titles, tasks, and ideas about the importance of various skills and content areas to be taught in the curriculum for success in the workplace. It was also the desire of the author to compare the results of these studies specifically the respondents' perceptions of the importance of various technical and non-technical skills.

## **3. REVIEW OF RELATED LITERATURE**

The literature contains many studies identifying skills needed by individuals in the field of information systems and technologies. One study was conducted by the staff at Computerworld in which they contacted several national recruiters and staffing firms for their observations and predictions in an attempt to find out which jobs would be the hottest in 2001, by number of new hires, not by salary. According to Bernstein (2001), the 10 hottest jobs identified by the staff for 2001 were: (1) web developer, (2) database administrator, (3) security analyst, (4) Unix administrator, (5) E-commerce application developer, (6) C+ Object-Oriented/Visual Basic developer, (7) Java programmer, (8) network engineer, (9) PC technical support, and (10) quality assurance tester. Even with all the layoffs at dotcoms, "competition for information technologists has never been greater" (Lewis, 2001, p. 69). According to another survey, conducted in December of 2001, which surveyed 260 IT professionals knowledgeable about their company's IT staffing plans, the areas they

indicated as the top five highest priorities for hiring in 2002 were application development, network administration, security, database management, and web services (Pfenning, 2002).

According to Radcliff (2001), the following skills are still in demand despite the slow economy (last quarter of 2001): Java, C++, C, HTML, Visual Basic, Java, Active Server Pages, Oracle Developer 2000, Visual Studio, Microsoft Access, SQL Server, Oracle, DB2, Microsoft Exchange, Windows NT/2000, Linux, and other Unix. Networking skills still in demand include TCP/IP, routing, Ethernet switching, and 10BaseT switching; system software and support skills include Web server administration, project management, Internet application development, security, and help desk (Radcliff, 2001).

Networking, Internet/intranet development, help desk/end-user support, database management, and applications development were the specialties most in demand among all IT categories according to RHI Consulting's biannual Hot Jobs Report (RHI Consulting, 2002). In this study in which more than 1,650 CIOs were interviewed, various specific skills were identified as those in demand. For the area of networking, some of the skills were Windows 2000/NT, UNIX and/or Linux systems, security-related hardware and software experience, LAN/WAN management and systems administration, VPNs, TCP/IP, intrusion detection and firewall implementation; for Internet/e-commerce development, they were Java, JavaScript, JavaBeans, XML, HTML, CGI, Perl, ColdFusion, Visual Basic or Active Serve Page, Oracle and C++; for technical support, the job skills were Microsoft NT/2000/98, Unix and Microsoft Office applications; for database management, they were Oracle, SQL Server, DB2/UDB, Sybase and Informix technologies; and for applications development, the skills were object-oriented language skills, such as Visual Basic, Java and C++, and e-commerce applications development. For the area of networking, the report also listed interpersonal skills and business skills, and for the areas of Internet/e-commerce development and help desk/end-user support, it also listed interpersonal and communication skills (RHI Consulting, 2002).

Although there has been a decline in many areas in the economy, companies of all sizes continue to invest in technology . . . "in an effort to increase productivity, streamline internal processes and gain a competitive advantage" (RHI Consulting, 2002). There have been, however, many layoffs and even some cuts in IT with predictions of fewer IT jobs available in 2002. Fortunately, though, IT professionals can look forward to retaining their salary levels in 2002 (Hamblen, 2002). Other research, including that from the Information Technology Association of America (ITAA) shows there will still be jobs that will remain unfilled in 2002. The ITAA conducted a study in April of 2001 that "found that more than 425,000 jobs will remain unfilled

in the next 12 months. This number presents a decline from 2000, but is still indicative of the ongoing need for highly skilled IT professionals” (RHI Consulting, 2002). According to consulting firm Hewitt Associates LLC in Lincolnshire, Illinois, even though the economy may be cool, some jobs are still hot. IT professionals with skills that are in short supply and high demand, are still getting pay and perks comparable to those in past years” (“In Demand: IT Stars Require Premium Pay,” 2001).

In a study conducted by Medlin, Dave and Vannoy (2001), that identified students’ opinions on skills necessary to become successful IT professionals, their “findings support the reviewed literature in that technical skills are important but are not sufficient within themselves. Apparently, both organizational leaders as well as students recognize that in addition to knowledge of hardware and software, communications skills, analytical skills, and managerial skills are essential” (p. 69). They found that the literature indicated that organizations “are seeking individuals with the ability to integrate their technical knowledge with communication interpersonal, and organizational skills” (Medlin, Dave, and Vannoy, 2001, p. 65). According to a survey of the members of AITP (Davis and Gonzenbach, 2001), the respondents indicated the top skills needed for a position in the IS or IT field were the non-technical skills of thinking, teamwork, and desire to learn. “Employees of the twenty-first century must be committed to the soft skills. And this commitment doesn’t begin the first day on the job. This is a commitment that starts even prior to entry in the workforce and stems from the dedication to become a lifelong learner” (Buhler, 2001, p.15).

In regard to salaries, one of the best sources of information is that published by Robert Half International Inc. Through their research over the years, they have identified a formula (using a national average salary multiplied by a city index) to determine a starting salary for a specific position. The index figures are designed to serve as a guide to determine average salary figures in various cities in the U.S. “A number of factors such as company size, employee benefits, a candidate’s skill set and current market conditions can impact actual starting salaries” (RHI Consulting, 2002). Some salary ranges for top positions based on projections for 2002 were help desk-tier 1, \$29,250 to \$39,250, help desk-tier 2, \$33,500 to \$45,750, help desk-tier 3, \$45,000 to \$57,000; LAN Administrator, \$47,500 to \$68,000; programmer analyst, \$53,000 to \$80,000; network engineer, \$62,750 to \$87,000; and systems analyst, \$63,750 to \$81,750 (RHI Consulting, 2002).

#### **4. RESEARCH QUESTIONS**

The research questions for this research study were as follows:

1. What are the job titles, primary job foci, and tasks of Information Systems Technologies (IST) graduates employed in the field?
2. What are the types of technologies used in the workplace, specifically types of software and programming languages?
3. What are the content areas that graduates perceive as important for the curriculum?
4. Is there a difference in salary based upon the graduate’s age, gender, job focus area, or job location?
5. What are the general technical and non-technical skills that graduates perceive to be the most important in the workplace?

#### **5. METHODOLOGY**

The Information Systems Technologies program is a new four-year degree that began in the late 1990s. The first graduates were in May of 1999 with a total of 115 graduates by December 2000. While the college itself has about 20,000 students, the number of majors for this program ranges from 220 to 240 students. The program is in the College of Applied Sciences of Arts at a midwestern university in a somewhat rural community with a population of 27,000. The program focuses on the technical aspects related to Information Systems and Information Technologies. This is a degree with a general education background and a focus on specific technical areas such as programming and application development; database design; systems analysis, design, and implementation; networking; and web design. It does not have a strong emphasis on business management or mathematics. The curriculum is based on the Organizational Systems Research Association (OSRA) Curricular model.

The limitations of this study are that the results are unique to students in this university and major field of study. However, there are many colleges throughout the United States that have similar programs based on the OSRA curriculum.

Many of the graduates are employed by small to medium sized companies in the local area while others have been employed by large corporations such as 3COM, A.G. Edwards, Abbott Laboratories, ABS Consulting/Motorola, Boeing, Saturn Corp, SBC Services/Southwestern Bell, the Software Engineering Institute/Carnegie Mellon University, and State Farm.

In order to identify job experiences of graduates, types of companies employing them, as well as their titles, tasks, salaries, and so forth, a research study was undertaken during the spring of 2001. A survey instrument was designed, pilot tested, and field tested for graduates with an Information Systems Technologies degree. Revisions were made to the initial instrument to incorporate suggested changes based on the pilot and

field testing. In May 2001, surveys were mailed to all 115 graduates of the recently implemented Information Systems Technologies (IST) Program. The first graduating class was in 1999; therefore this group included those who graduated from May of 1999 through December of 2000. Sixty-six completed surveys were returned to the researcher for a response rate of 57%. The responses for the study were tabulated, and analyses were completed using the Statistical Analysis System, Version 6.11.

6. FINDING AND RESULTS

6.1 Demographics

**Age, Gender, and Race.** Almost half (49%) of the respondents were less than 24 years of age. However, 33% were 24 to 29 years of age, and 18% were age 30 or over. Of the 66 respondents, 53% were female and 47% were male. While 74% of the respondents were American Caucasian, 26% were from other ethnic backgrounds.

Table 1  
Demographics of Graduates

Characteristic	Number	Percent
Age		
23 years or younger	32	48.5
24 to 29 years old	22	33.3
30 years or older	12	18.2
Total	66	100.0
Gender		
Female	35	53.0
Male	31	46.9
Total	66	99.9*
Race		
American Caucasian	49	74.2
African American	10	15.2
Asian	4	6.1
Hispanic	2	3.0
Other	1	1.5
Total	66	100.0

\* Does not equal to 100.0 due to rounding.

**Employment Status.** When asked if they were currently employed full time, over three-fourths of the respondents (83%) indicated they were employed full time in an IST position. Nine percent indicated they were employed full time but in a position outside the IS field, and 5% were seeking employment. The remaining 3% were either employed part time or were not currently employed but had been employed in the IST field after graduation.

In regard to years of work experience in the field, 58% indicated they had 2 years or less. Thirty five percent indicated they had 3 to 5 years of experience, and 8% had 10 to 11 years of experience. Those individuals

with more than 3 years of experience had work experience prior to the completion of their degree.

**Length of Time to Obtain Employment.** Graduates were asked to indicate how long it took them to get their first IST-related job. Seventy eight percent of the graduates were employed in the field within three months of graduation. Fourteen percent accepted a position 3 to 6 months after graduation; 2% accepted a position within 6 to 9 months of graduation; 2% accepted a position after 1 year of graduation, and 5% marked the "other" category.

Table 2  
Employment Characteristics

Characteristic	Number	Percent
Employment Status		
Full Time in IST Position	54	83.1
Full Time in Other Type of Position	6	9.2
Part Time	1	1.5
Seeking Employment	3	4.6
Not Seeking, was employed in IST position	1	1.5
Total	65	99.9*
Years of Work Experience		
2 years or less	38	57.6
3 to 5 years	23	34.8
6 to 9 years	0	0.0
10 to 11 years	5	7.6
Total	66	100.0
Time to Obtain Employment		
Less than 3 months	45	77.6
3 to 6 months	8	13.8
6 to 9 months	1	1.7
Over one year	1	1.7
Other	3	5.2
Total	60	100.0

\* Does not equal to 100.0 due to rounding.

**Location of Employment.** The largest numbers of graduates were employed in Southern Illinois (34%) and the second largest numbers were employed in the Chicago area (24%). Other employment locations can be seen in Table 3.

**Salary.** The largest number of respondents (18%) indicated the salary range of their first IST-related job was \$40,000 to \$44,999. Sixteen percent received \$45,000 to \$49,999; and 5% were paid \$50,000 or more. The others received less than \$40,000 as shown in Table 4.

6.2 Research Question No. 1

The first research question was: What are the job titles, primary job foci, and tasks of Information Systems Technologies (IST) graduates employed in the field?

**Table 3**

<b>Employment Location</b>		
Location	Number	Percent
Southern Illinois	21	33.9
Central/Northern Illinois	8	12.9
Chicago Area	15	24.2
St. Louis/Metro East	6	9.7
Other States	12	19.4
Total	62	100.1*

\* Does not equal to 100.0 due to rounding.

**Table 4**  
**Salary**

Salary	Number	Percent
Less than \$25,000	9	16.1
\$25,000 to \$29,999	9	16.1
\$30,000 to \$34,999	8	14.3
\$35,000 to \$39,999	8	14.3
\$40,000 to \$44,999	10	17.9
\$45,000 to \$49,999	9	16.1
\$50,000 to \$54,999	1	1.8
\$55,000 or more	2	3.6
Total	56	100.2*

\* Does not equal to 100.0 due to rounding.

The job title provided most often by the respondents (24%) was in the category of technical/end user support. Fifteen percent of the respondents' job titles were in the category of systems analysis, and 12% indicated they had a title related to networking/systems administration. Table 5 is a compilation of job categories for IST graduates.

Graduates were asked to identify their primary job foci. Thirty four percent indicated their primary job focus was technical/end user support, and 18% responded that their primary focus was computer programming. Responses to this question can be seen in Table 6.

Respondents were asked what type of job tasks and responsibilities they routinely performed. The tasks and responsibilities most often marked by graduates employed in the field were providing technical/end user support (59%), installing software (47%), and installing/maintaining computer devices (41%). One-third or more of the respondents also marked managing information (39%), analyzing systems (35%), maintaining/troubleshooting networks (35%), maintaining accounts (33%), and maintaining databases (33%). Respondents were given numerous choices and were asked to mark all that applied. Their responses are detailed in Table 7.

**6.3 Research Question No. 2**

The second research question was: What are the types of technologies used in the workplace, specifically types

of software and programming languages?

The respondents were provided a list of different types of operating system software, office suite software, groupware software, and web authoring/design software. They were asked to mark all that were used by individuals in their company.

**Table 5**

<b>Job Categories/Titles</b>		
Categories/Titles	Number	Percent
Technical/ End User Support		
	16	24.2
Systems Analysis/Design	10	15.2
Networking/Systems Administration	8	12.1
Computer Programming	7	10.6
Information Management	5	7.6
Web Design & Development	3	4.5
Administrative Assistant	3	4.5
Graduate Student	3	4.5
Database Design	2	3.0
Professional Development	2	3.0
Not Employed	1	1.5
Other	6	9.1
Total	66	99.8*

\* Does not equal to 100.0 due to rounding.

**Table 6**  
**Primary Job Focus**

Job Focus	Number	Percent
Technical/End User Support	19	33.9
Computer Programming	10	17.9
Database Design/Development	5	8.9
Networking	5	8.9
Web Design/Development	4	7.1
Systems Analysis/Design	3	5.4
Information Management	2	3.6
Information Security	2	3.6
Other	6	10.7
Total	56	100.0

The operating systems used by the majority of the companies were Windows NT (61%), Windows 95 or 98 (47%), and Windows 2000 (47%). Unix was used by 36% and Novell Netware by 24% of the respondents. All operating systems listed on the survey are shown in Table 8.

The respondents were asked to indicate the type of computer languages used for writing and editing programs. There were a wide variety of languages listed. The language used by the largest number was SQL (52%). Visual Basic (35%) and Java (33%) were used by over one third of the respondents.

Other languages being used by over one-quarter of the respondents include Java Script, VB Script, and C/C++. It is also interesting to note that 21% are still using COBOL. The programming languages used by the companies employing the graduates can be seen in Table 10.

**Table 7**  
**Tasks Routinely Performed**

Task	Number	Percent
Providing Technical/End User Support	39	59.0
Installing Software	31	47.0
Installing/Maintaining Computer Devices	27	40.9
Managing Information	26	39.4
Analyzing Systems	23	34.9
Maintaining/Troubleshooting Networks	23	34.9
Maintaining Accounts	22	33.3
Maintaining Databases	22	33.3
Setting Up/Configuring LANs	18	27.3
Customizing Computer Programs	17	25.8
Writing Computer Programs	15	22.7
Developing/Redesigning Systems	14	21.2
Designing Databases	13	19.7
Maintaining Web Pages	13	19.7
Monitoring Security Systems	12	18.2
Creating Web Pages	11	16.7
Configuring/Maintaining WANs	7	10.6
Developing E-commerce Applications	7	10.6
Installing Security Systems	7	10.6
Other	10	15.2

**Table 8**  
**Types of Operating Systems**

Operating Systems	Number	Percent
Windows NT	40	60.6
Windows 95 or 98	31	47.0
Windows 2000	31	47.0
Unix	24	36.4
Novell Netware	16	24.2
Linux	6	9.1
Mac OS	6	9.1

In regard to types of office suites, Microsoft Office Suite was the one used by the majority of respondents (77%). In the category of workgroup computing, Microsoft was again the company that manufactured the most used software program. Microsoft Outlook/Exchange was used by a majority (50%). Oracle was used by 36% and Lotus was used by 27% of the respondents. When examining the type of web design software used, the two programs most used were HTML Editors (24%) and Microsoft FrontPage (17%). There were various other

programs used for web design. These software programs can be seen in Table 9.

**Table 9**  
**Types of Software Suites and Groupware Software**

Software	Number	Percent
Software Suites		
Microsoft Office	51	77.3
Corel Office Suite	3	4.6
Lotus Smart Suite	2	3.0
Groupware Software		
Outlook/Exchange	33	50.0
Oracle	24	36.4
Lotus Notes	18	27.3
Netscape Communicator	12	18.2
Novell GroupWise	8	12.1
Web Design Software		
HTML Editors	16	24.2
Microsoft FrontPage	11	16.7
Macromedia Dreamweaver	9	13.6
XML	10	15.2
Cold Fusion	9	13.6
Netscape Composer	2	3.0

**Table 10**  
**Types of Programming Languages**

Languages	Number	Percent
SQL	34	51.5
Visual Basic	23	34.9
Java	22	33.3
Java Script	18	27.3
VB Script	18	27.3
C/C++	17	25.8
COBOL	14	21.2
Perl	11	16.7
ActiveX	10	15.2
RPG	5	7.6
Other	20	30.3

**6.4 Research Question No. 3**

The third research question was: What are the content areas that graduates perceive as important for the curriculum?

Graduates were asked to indicate the level of importance they felt should be placed on 25 specific content areas. These areas were selected based on a review of content from various curricula in selected related programs and of the topics discussed in the literature. They responded by selecting a number between 1 and 5, with 1 being not important, 2 being somewhat important, 3 being important, 4 being very important, and 5 being extremely important. Eleven content areas had the

**Table 11**  
**Content Areas to Be Included in the Curriculum**

Content Areas	Not Important	Somewhat Important	Important	Very Important	Extremely Important
Accounting	27.7	30.8	30.8	7.7	3.1
Business Communications	0.0	12.3	23.1	36.9	27.7
Business Law	13.9	35.4	26.2	18.5	6.2
Statistics	15.6	39.1	23.4	20.3	1.6
Telecommunications	1.6	3.1	10.9	43.8	40.6
Programming Language(s)	0.0	3.1	16.9	30.8	49.2*
Word Processing Software	3.1	15.4	27.7	20.0	33.9*
Spreadsheet Software	3.1	15.4	27.7	20.0	33.9*
Database Software	1.5	6.2	15.4	21.5	55.4*
Groupware Software and Workgroup Computing	3.1	6.2	16.9	43.1	30.8
Project Management Methodology and Software	0.0	6.3	14.1	39.1	40.6*
Data Modeling	3.1	7.8	23.4	46.9	18.8
Information Security	1.5	4.6	10.8	33.9	49.2*
Disaster Prevention/Recovery Systems	7.7	12.3	20.0	36.9	23.1
Encryption	7.8	18.8	34.4	23.4	15.6
Quality Assurance	4.8	7.9	31.8	28.6	27.0
Hardware and Software Capital Expense Budgeting	14.1	17.2	32.8	23.4	12.5
Troubleshooting	1.5	0.0	6.2	23.1	69.2*
Networks	1.5	1.5	13.9	21.5	61.5*
Operating Systems	1.5	0.0	12.3	27.7	58.5*
Decision Support Systems	4.6	6.2	24.6	40.0	24.6
Integrated Information Systems	1.5	1.5	27.7	40.0	29.2
Systems Analysis and Design	0.0	4.6	16.9	43.1	35.4
Records Information Management	23.1	21.5	30.8	23.1	1.5
General Principles of Management	3.1	13.9	30.8	32.3	20.0
Ethics	6.2	12.3	26.2	24.6	30.8
Presentation Software	4.6	15.4	38.5	24.6	16.9
Current Issues in Computer Technology	0.0	3.1	12.3	26.2	58.5*

“extremely important” option chosen by the **largest number** of respondents for that topic. These are marked with an asterisk in Table 11. They are not listed in any specific order

#### .6.5 Research Question No. 4

The fourth research question was: Is there a difference in salary based upon the graduate’s age, gender, job focus area, or job location?

In determining if there was a difference in the salary of the graduates based upon their age, gender, job focus area, or job location, a series of ANOVAs were run. There were no significant differences in salary based on age, gender, or job focus. The only F test that showed a significant difference between salaries was in job location. The F test found a significant relationship  $F(4, 49) = 8.52, p < 0.05$ . These F values can be seen in Tables 12-15.

The Scheffé post-hoc multiple comparison procedure

found a significant difference in salaries between those employed in southern Illinois and the St. Louis/Metro East area, between salaries in southern Illinois and Chicago, and between southern Illinois and other states. The mean of these groups of salaries for each location was significantly higher than in southern Illinois. There were no significant differences between the other locations (see Table 3 for information on different locations and numbers of graduates employed in each). It should be noted that the “other” group included graduates employed in all areas outside of Illinois and the St. Louis/Metro East area.

#### 6.6 Research Question No. 5

The fifth research question was: What are the technical and non-technical skills that graduates perceive to be the most important in the workplace? The graduates were given two listings of skill areas and asked to place a vertical mark on the line following each (from low to high) to indicate their

**Table 12**  
**Differences in Age**

Source	df	Sum of Squares	Mean Square	F	p
Age Group	2	3.7202	1.8601	0.48	0.6206
Error	53	204.7798	3.8638		
Total	55	208.5000			

\*p<0.05

**Table 13**  
**Differences in Gender**

Source	df	Sum of Squares	Mean Square	F	p
Gender	1	0.1117	0.1117	0.03	0.8655
Error	54	208.3883	3.8590		
Total	55	208.5000			

\*p<0.05

**Table 14**  
**Differences in Main Job Focus Area (Job Position)**

Source	df	Sum of Squares	Mean Square	F	p
Job Position	6	36.0694	6.0116	1.69	0.1434
Error	47	166.7639	3.5482		
Total	53	202.8333			

\*p<0.05

**Table 15**  
**Differences in Job Location**

Source	df	Sum of Squares	Mean Square	F	p
Location of Employment	4	81.2142	20.3036	8.52	0.0001
Error	49	116.7858	2.3833		
Total	53	198.0000			

\*p<0.05

opinion regarding the importance of each for a position in the IS or IT field. The list of courses was divided into two sections on the survey instrument. The first group of skills included eight non-technical skills and the second group included ten technical skills. Vertical marks were converted to numbers from 1 to 5 and means were determined for each skill.

When all skills were put in order by mean, it was interesting to see that the six highest means were for non-technical (soft) skills. As can be seen in Table 16, the top six skills were thinking skills, desire to learn, personal characteristics, personal attitude, teamwork, and communications.

## 7. CONCLUSIONS & IMPACT ON EDUCATION

The literature and findings from this study show that there are many specific skills, areas of knowledge, and software programs considered important for IS and IT

positions. These are the skills, needed in positions such as technical/end user support, computer programming, database design and development, networking, web design and development, and systems analysis and design. Educators can see from this study that new hires in the field are doing such tasks as (1) providing technical and end user support, (2) installing software, (3) installing and maintaining computer devices, (4) managing information, (5) analyzing systems, and (6) maintaining and troubleshooting networks. These and other skills are ones that need to continue to be emphasized in the classroom. The content areas that the majority of the graduates indicated were extremely important (network, troubleshooting, operating systems, current issues in computer technology, and database software) are consistent with what the literature shows.

The Windows operating system software programs as well as various Windows application programs continue



Table 16

Technical and Non-Technical Skills and Knowledge		
Skill	M	Std Dev
Thinking Skills	4.55	0.50
Desire to Learn	4.48	0.55
Personal Characteristics	4.48	0.49
Personal Attitude/Motivation	4.47	0.56
Teamwork	4.45	0.71
Communication Skills	4.35	0.75
Computer Software Skills	4.31	0.56
Telecommunications and Networking	4.11	0.85
Computer Hardware Skills	4.10	0.87
Supervisory Skills	4.08	0.80
Basic Foundation and Analytical Skills	4.02	0.91
Programming Skills	3.86	0.95
Systems Analysis and Design	3.84	1.03
Database Design and Development	3.64	0.98
Information Systems and Technology	3.45	1.03
Project Management	3.36	1.16
Records and Information Management	2.79	1.31
Basic Business	2.26	1.10

to grow in usage in most areas. This indicates the need for educators to provide training on the widely used Microsoft products; however, it is also essential for students to have exposure to other hardware and software products as well. Some of the programming languages that have been around for many years are continuing to be used a great deal while others are slowly being replaced with new programs such as Java, Visual Basic, and new versions of HTML. Most importantly, it is essential to teach the foundation programming skills, and prepare students to understand they will need to learn new skills and new programs throughout their employment as new technologies and programs emerge. Many individuals in business and industry comment that they want college graduates with the basic foundation skills and they will train them on specific programs used by the company.

The field of information systems and information technologies continues to grow and the demand is high, even though the economy is much slower at this time and graduates of 2002 will be faced with a tighter job market than those of 2000. However, out of this group of graduates from 1999 and 2000, eighty-three percent indicated they were employed full-time in an IST position and 77% were employed within three months of graduation. The largest number of respondents indicated the salary of their first IST related job was in the range of \$40,000 to \$44,999. The salary ranges, according to RHI Consulting (2002) are higher for most job categories which is to be expected since the salaries of these graduates in this study are mostly for entry-level jobs with minimal or no experience required.

Even though this study found there was no significant difference in the graduates' salaries based on age, gender, or primary job area, there might be a difference with another group of graduates from another university. The results from this study did find a significant difference based on the geographical location of employment, which is expected and typical in many areas.

The study shows that even the recent graduates recognize the importance of non-technical skills. Sometime students do not see the importance of these skills as much as the technical skills. However, most individuals who have had experience in the workplace see the importance of these skills, and indicate a desire for graduates to get a well rounded education that provides excellent technical training as well as opportunities to develop thinking skills, personal characteristics, teamwork, and communication skills. The challenge for educators is how to incorporate these "soft" skills into the curriculum and help students understand the importance of them. Separate courses can be taught for some of these areas such as communications (written and oral). However, most of these "soft" skills can be worked into group projects, case studies, and general classroom activities. Another goal for educators should be to demonstrate an interest in the subject matter in a way to help students develop a passion for learning. It is also essential they have a realization that education is a "lifelong" process. The more an individual enjoys what he or she does, and desires to give the organization, the more he or she will likely be able to contribute to the company.

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