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# TECH SKILLS IN TAMPA: TECHNOLOGY JOB NEEDS IN A CHANGING WORLD

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## Abstract

*Numerous economic and political changes have occurred over the past two years. This study is a follow-up of a 2001 survey which identified the IS skills in greatest demand in Tampa and the Southeast U.S. Like the earlier study, classified ads appearing the region's major newspapers during the Fall of 2002 were analyzed. This paper highlights these findings and compares them to the technology skills employers from other regions (e.g. Mid-Atlantic states, New England states) have deemed important. It also suggests curriculum implications for information systems educators with respect to new program and course creation as well as directions for future research based on comparison with other regions of the U.S.*

**Keywords:** Information technology skills, jobs, needs assessment, pedagogical implications, Southeast U.S.

## Introduction

Changes in the global and domestic economies have affected hiring in the U.S. The Southeast has seen its demand for jobs change over the past few years as well. To address this changing demand for technology-literate workers in Tampa and the Southeast region, a survey of major regional newspapers was undertaken to determine which skills were in greatest demand by employers within the region. Students and faculty alike are aware of the insatiable demand for skilled knowledge workers with a strong background in technology concepts. The challenge faced by university faculty curriculum committees is to assess their current program and course offerings to determine which skills are still applicable and which, if any, are no longer needed. This study is a follow-up of the 2001 survey of job needs in the Southeast U.S. This paper will compare current results with those of the previous study to determine the magnitude of the change and how educators should prepare.

Local and regional employers in the Southeast are having a difficult time hiring competent, skilled workers with a strong information technology background. One only needs to read articles in the *Tampa Tribune*—"Florida's Service Reputation May Do State A Disservice" (Follick, 2003) and the *St. Petersburg Times*—"The Drain in the Talent Pool" (Hau, 2002) to get an idea of the magnitude of the problem.

"Florida has led the nation in the number of new jobs created during the past two years. But, as the official pronouncements suggest, most of those are low- to middle-paying service sector jobs. Florida's economy expands, rather than climbs, by providing services for tourists, retirees and newcomers. Projections show that more than 40 percent of Florida workers in 2025 will be employed in service-oriented jobs. That's more than all but one state. The service-industry-heavy work force has put Florida's per capita wage 18 percent below the national average. The nation's fourth-most-populous state ranks 19th in the number of technology companies and sixth in the number of technology employees" (Follick, 2003).

According to the Florida High Tech Corridor (2003), the unemployment rate for the Tampa Bay area in January 2003 was 4.9%, compared to 5.6% for Florida and 6.5% for the United States. With respect to high tech, a changing business environment, relatively low median incomes, and the lack of a large college-educated workforce are just some the reasons the Southeast U.S. (and Tampa in particular) has a difficult time finding and keeping technology workers. While it is beyond the scope of this paper to address the cost of living or educational issues, an attempt will be made to determine which technology skill sets are necessary and in demand by employers and how colleges and universities should respond to these needs.

Previous studies have looked at the classified ads for trends and skills. A recent study on the Southeast U.S. (Papp, 2002) and studies of other regions such as the Middle Atlantic states (Jacobson and Armstrong, 1996) and New England (Papp, 1998) have suggested that the classified ads can be used to gauge demand for technology jobs. This paper will use a methodology similar to that undertaken by Jacobson and Armstrong (1996), Case, Price, and Rogers (1997), and Papp (1998). It will highlight the changing skills demand from the earlier studies, but focus on Tampa and the Southeast region.

## Methodology

This study has attempted to determine which skills are in demand by employers in Tampa and the Southeast region by analyzing classified ads for information systems jobs using the five largest newspapers in the region. Ads from both the actual printed classifieds as well as the Internet web sites of these newspapers were included. Follow-up studies are planned for the future to determine the longitudinal implications of these skill sets.

The papers selected for this study included the Sunday edition of the *Tampa Tribune* (covering the West coast of Florida and the greater Tampa Bay area), the *St. Petersburg Times* (covering Pinellas county and greater Tampa Bay), the *Orlando Sentinel* (covering Orlando and central Florida), the *Miami Herald* (covering Miami and southeast Florida), the *Tallahassee Democrat* (covering Tallahassee and the Florida panhandle), the *Florida Times-Union* (Covering Jacksonville and northeast Florida) and the *Atlanta Journal-Constitution* due to the influence of Atlanta and its economy on the Southeast region.

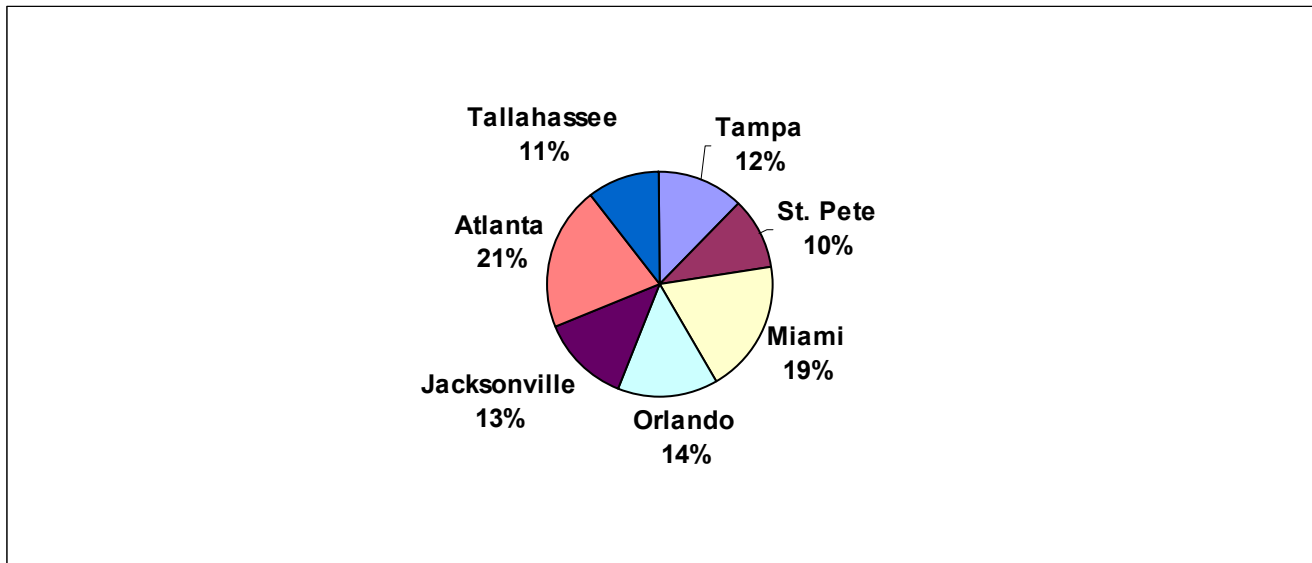
Following the coding of previous studies (Jacobson and Armstrong, 1996; Case, Price, and Rogers, 1997; Papp, 1998; Papp, 2001), more than one hundred criteria were used to group several categories such as general job skills, information systems skills, programming languages, hardware platforms and operating systems, database skills, networking topologies and structures, application packages, specialized development software and educational backgrounds. The same coding methodology was employed as that used by Jacobson and Armstrong (1996):

The study was limited to ads for business-oriented IS positions placed by organizations for their own work force and to ads placed by consulting firms who hire individuals to work for them. If the advertisement was for a specific number of positions, with a particular set of skills, the need for those skills was tallied for that number. However, when the number of positions to be filled was not indicated, the skill was tallied only once (p. 45).

Thus, by using a similar classification scheme, it becomes possible to compare the demand for positions and skills across both cities and time periods and also allows for replication of the study in the future by providing a means with which to compare other regions. To address reliability concerns and enable comparison with earlier studies on different regions, all information systems ads were scanned and only those ads that met the criteria noted above were included. Ads for IS sales positions, teachers, and non-technical personnel were not included in the survey.

## Results

Since the coverage of these papers sometimes overlaps, they have been analyzed more with respect to regional needs rather than focusing on a specific metropolis. This provides a look at skills needed in the different regions of Florida and the Southeast, each of which has its own industrial and technical niche. The *Tampa Tribune* and *St. Petersburg Times* were grouped together to represent the Tampa Bay (West Central) region, the *Orlando Sentinel* focuses on Central Florida, the *Miami Herald* on South Florida, the *Florida Times-Union* on Northeast Florida, the *Tallahassee Democrat* on the Florida Panhandle, and the *Atlanta Journal-Constitution* on Metro Atlanta and the Southeast region in general.



**Figure 1. Technology Jobs By City: September – December 2002**

Information systems advertisements appearing in the seven papers on each Sunday in September, October, November, and December of 2002 resulted in a total of 979 jobs. The ads were analyzed using the methodology described above and the results were tabulated and analyzed using an Excel spreadsheet.

With respect to general job skills, those in the greatest demand were interpersonal and communication skills and non-specific information systems skills, suggesting the need for computer literacy and oral and verbal communication skills. In the Tampa Bay region in particular, there was a need for coordination and project management skills as well. This supports earlier studies in that “soft skills” continue to be deemed important by employers. Table 1 illustrates the percentage of ads requesting each of the specific skills mentioned.

**Table 1. General Job Skills**

	<b>Tampa Bay</b>	<b>Central Florida</b>	<b>South Florida</b>	<b>North Florida</b>	<b>Florida Panhandle</b>	<b>Metro Atlanta</b>
Coordination & Project Management	11%	10%	13%	7%	5%	9%
Interpersonal & Communication Skills	6%	4%	12%	6%	7%	9%
Problem Solving & Analytical skills	2%	2%	3%	8%	5%	3%
Non-specific IS Skills	20%	17%	8%	9%	7%	11%

With respect to specific information skills, those in greatest demand were design and development and networking and telecommunications. There was also a fairly large demand for database administration skills, something not seen in previous studies of other regions. The demand for networking and telecommunications and database administration is most likely due to recent developments in Internet technologies and the availability of database programs. There was a marked decline across all regions of the Southeast U.S. for hardware and software implementation. Table 2 delineates the most common IS skills.

**Table 2. Information Systems Skills**

	<b>Tampa Bay</b>	<b>Central Florida</b>	<b>South Florida</b>	<b>North Florida</b>	<b>Florida Panhandle</b>	<b>Metro Atlanta</b>
Design & Development	17%	15%	24%	18%	19%	18%
Hardware & Software Implementation	3%	1%	8%	1%	1%	4%
Networking & Telecommunications	16%	17%	12%	12%	23%	21%
Database Administration	7%	4%	9%	8%	5%	10%

The educational background requested by most employers was that of a bachelor's degree. This is in line with previous studies of other regions (Case, Price, and Rogers, 1997; Jacobson and Armstrong, 1996; Papp, 1998 & 2002). There was also a greater demand for employees with advanced degrees than in previous years' studies. This, coupled with a large increase in the number of jobs requiring three or more years of experience, is a significant finding may be indicative of the recent economic downturn and suggests that employers are looking for more work experience, even for entry-level jobs advertised in the classifieds. It is not known if this change from earlier studies is a temporary anomaly or a long-term trend. Table 3 breaks down the education and training requirements.

**Table 3. Educational/Training and Years of Experience**

	<b>Tampa Bay</b>	<b>Central Florida</b>	<b>South Florida</b>	<b>North Florida</b>	<b>Florida Panhandle</b>	<b>Metro Atlanta</b>
Bachelor's Degree	16%	17%	27%	14%	27%	29%
Advanced Degree	3%	3%	3%	6%	4%	2%
1-2 Years Experience	9%	9%	22%	15%	12%	13%
3-4 Years Experience	12%	7%	17%	8%	8%	15%
5+ Years Experience	7%	7%	17%	10%	5%	8%

Previous studies looked at the demand for hardware platforms. In this analysis, there was no specific mention of mainframe systems and mini- and mid-range systems. This is in line with previous studies of other regions and reflects a nationwide trend in migration toward personal computers and away from mainframe and minicomputers. Specific mention of the AS400 platform, although small, has increased over previous studies of other regions (Case, Price, and Rogers, 1997; Jacobson and Armstrong, 1996; Papp, 1998 & 2002). Table 4 lists hardware platform requirements.

**Table 4. Hardware Platforms**

	<b>Tampa Bay</b>	<b>Central Florida</b>	<b>South Florida</b>	<b>North Florida</b>	<b>Florida Panhandle</b>	<b>Metro Atlanta</b>
Personal Computers	5%	3%	1%	1%	1%	3%
AS400	8%	1%	4%	9%	0%	5%
Mainframe systems	0%	0%	0%	0%	0%	0%

Not surprisingly, Windows was the operating system in greatest demand. The new version (Windows XP) along with older versions (2000, NT, 95/98) was requested in many ads. DOS remains dead. Demand for UNIX has grown and represents a significant increase in popularity over previous studies of other regions. As mentioned earlier, the AS/400 platform has also seen an increase in demand over previous studies. The demand for Novell seems to be slipping a bit and was not as strong as in the past (Case, Price, and Rogers, 1997; Jacobson and Armstrong, 1996; Papp, 1998 & 2002). Table 5 highlights the Operating Systems demands for each area.

**Table 5. Operating Systems**

	<b>Tampa Bay</b>	<b>Central Florida</b>	<b>South Florida</b>	<b>North Florida</b>	<b>Florida Panhandle</b>	<b>Metro Atlanta</b>
Windows XP	3%	6%	4%	2%	5%	6%
Windows 2000	6%	5%	5%	3%	4%	3%
Windows NT	6%	1%	4%	5%	9%	3%
Windows 95/98	18%	15%	12%	4%	13%	15%
Novell Netware	6%	8%	6%	6%	3%	5%
UNIX	14%	14%	8%	10%	13%	17%
DOS	0%	0%	0%	0%	0%	0%
AS/400	8%	1%	4%	9%	0%	5%
AIX	1%	1%	1%	1%	0%	0%

In a change from past studies (Case, Price, and Rogers, 1997; Jacobson and Armstrong, 1996; Papp, 1998), there is a new, increased demand for Internet-related languages such as JAVA, JavaScript, HTML, XML and ASP. The growth of the Internet over the past few years is reflected in the demand for these new languages. There was scant demand for COBOL and less demand for older object-oriented languages such as Visual Basic and C++ than in the past. The movement from older procedural languages to new object-oriented languages and especially Internet-based languages seems to be a national trend. Previous studies of the New England region (Papp, 1998), the Southeastern U.S. (Case, Price, and Rogers, 1997; Papp, 2002) and in the Middle Atlantic states (Jacobson and Armstrong, 1996) support this. Table 6 illustrates the breakdown by language.

**Table 6. Programming Languages**

	<b>Tampa Bay</b>	<b>Central Florida</b>	<b>South Florida</b>	<b>North Florida</b>	<b>Florida Panhandle</b>	<b>Metro Atlanta</b>
ASP	12%	12%	4%	11%	9%	11%
C	7%	8%	4%	2%	8%	6%
C++	7%	15%	6%	4%	6%	11%
COBOL	1%	2%	2%	0%	2%	2%
JAVA	11%	16%	7%	6%	16%	11%
JAVASCRIPT	1%	3%	4%	4%	5%	1%
VISUAL BASIC / VB .Net	4%	7%	6%	7%	10%	4%
HTML / DHTML	7%	13%	5%	4%	8%	8%
XML	3%	4%	0%	0%	1%	0%

Specialized application package needs varied by sub-region. This is also not surprising given the different types of business found in each area. The applications consistently in greatest demand were SAP, Microsoft Office, Exchange and Visio. The demand for SAP is particularly noteworthy as it has increased dramatically over the last few years. This may be a result of the growth of e-commerce and the need to integrate various systems. Table 7 breaks down the applications by region.

**Table 7. Software Applications & Specialized Tools**

	<b>Tampa Bay</b>	<b>Central Florida</b>	<b>South Florida</b>	<b>North Florida</b>	<b>Florida Panhandle</b>	<b>Metro Atlanta</b>
Front Page	2%	2%	1%	1%	2%	1%
Lotus Notes	2%	4%	2%	0%	0%	4%
Microsoft Office	22%	12%	10%	14%	9%	13%
Microsoft Exchange	2%	3%	2%	0%	1%	3%
VISIO	4%	12%	2%	6%	11%	5%
SAP	11%	12%	16%	19%	10%	20%

Database skills made up a large percentage of the total number of ads. Among the specific systems mentioned, Oracle was first, followed closely by Access. This continues to support a national trend as ads from the Southeastern U.S. (Case, Price, and Rogers, 1997; Papp, 2002), the Mid-Atlantic states (Jacobson and Armstrong, 1996) and New England (Papp, 1998) also demand these skills. A new finding is the specific mention of and demand for SQL. Table 8 illustrates database needs.

**Table 8. Database Systems**

	<b>Tampa Bay</b>	<b>Central Florida</b>	<b>South Florida</b>	<b>North Florida</b>	<b>Florida Panhandle</b>	<b>Metro Atlanta</b>
Access	6%	2%	4%	5%	12%	5%
dBase	0%	0%	0%	0%	0%	1%
DB2	1%	1%	1%	1%	5%	2%
FoxPro	0%	1%	2%	2%	3%	0%
IMS	0%	0%	0%	0%	0%	0%
Oracle	5%	5%	2%	1%	1%	9%
Sybase	5%	8%	4%	4%	2%	2%
SQL	8%	8%	6%	8%	14%	3%

## Discussion and Implications

Some interesting trends and patterns emerge when the results of jobs available in Tampa and the Southeast region are compared with that of New England (Papp, 1998), the Middle Atlantic states (Jacobson and Armstrong, 1996) and the Southeastern U.S. (Case, Price, and Rogers, 1997; Papp, 2002). Employers continue to seek coordination & project management ability, strong interpersonal & communication skills, and problem solving & analytical competence. This supports findings from studies of other regions. Basic skills are a necessary co-requisite for a position in information systems. Windows (XP, 2000, NT, 95/98) and Unix are the operating systems in greatest demand. This, coupled with a movement toward personal computers, mirrors a national trend as firms begin to move programs and data from mainframe systems to a more distributed environment. Programming language needs are also changing. Previous studies have suggested a move toward newer object-oriented languages. While still popular, the current languages most in demand are those associated with the Internet—ASP, HTML, XML, Java and JavaScript. The emergence of e-commerce has undoubtedly affected this demand. Along the same lines, database skills are also highly sought and Oracle and Access remain the most demanded skills. Interestingly, demand for SQL and database administrator skills are on the rise, suggesting a need for employees with a strong general background in database. Also noteworthy is the change in years of experience required. While classified ads have typically been used to advertise and recruit for lower-level or entry-level jobs, the changing economic climate has made it advantageous and, in some cases necessary, to have more experience for these “entry-level” jobs.

With respect to technology, graduating students (at the University of Tampa) were surveyed and felt prepared in networking, systems analysis, and database theory. They expressed a need to learn specific skills such as Oracle, SQL, Java, and Microsoft certification. This presents a dilemma for MIS educators. Do we teach the latest hot skills or do we teach concepts that students can adapt to changing requirements and technologies? This author concurs with Case, Price, and Rogers (1997), who suggest

that universities must emphasize lifelong learning and students should be provided with a strong conceptual foundation with which they can acquire and adapt to new skill sets to meet changing business needs.

Tech skills notwithstanding, there is even greater demand for business skills, especially oral, written, and presentation skills. This is echoed by employers, who have requested these “soft” skills as co-requisites to the obvious “technical” skills. Employers surveyed in the Tampa Bay area feel that current graduates have the requisite minimum in terms of technical and business skills. To this end, many graduates are undertaking one or more internships or part-time jobs to boost their work experience and provide them with a better overall portfolio. The results are encouraging as 87% of University of Tampa (UT) graduates were employed upon graduation or elected to pursue a graduate degree. The median salary was \$59,214 for UT MBA graduates and \$35,464 for business undergraduates (Coughenour, 2003).

However, employers in the Tampa Bay area face many of the same needs as other areas of the country. Students with a strong information systems background are few and jobs are available, despite the recent economic downturn. The climate may quickly change as the economy rebounds, according to a recent Tampa Bay Business Journal article (Leavy, 2003). While a large portion of local graduates live and work within the Tampa Bay area, an increasing number are choosing to take positions outside Florida (e.g. Atlanta, Silicon Valley) due to higher salaries. Companies are also reluctant to move into Florida due to human resource and infrastructure concerns. A new initiative for a “Technology Corridor” along Interstate 4 from Tampa to Orlando proposed by governor Bush has not come to fruition. “Florida has had the burden of not being a popular business state. That's changing... CEOs don't really know much about Florida from a high-tech point of view. They may know about Florida from the tourist, retirement and sunshine point of view” (Follick, 2003). If Tampa and the Southeast region do not address these concerns, the technology industry will continue to bypass this region for other parts of the country. Tampa Bay offers low taxes, low cost of living and a world class shipping port and airport. Maybe the recent Super Bowl victory by the Tampa Bay Buccaneers will bring more attention to this area and allow it to emerge as a world class city.

As educators, we must do our part to assist students in the learning process and prepare them for the dynamic global business environment. Now that employer demands are better known, we can prepare today's students for the jobs of tomorrow.

## Future Research

Over the past few years, three regions of the U.S. have been analyzed with respect to information systems job skills and employer needs. The current study looked at both printed classified ads as well as those appearing on the papers' websites. Future research should also consider on-line job sites (e.g. computerwork.com, monster.com, computerjobs.com, etc.) to determine the extent of job skills and needs over larger geographic areas. Regional analysis of other areas of the country (e.g. the Midwest, the West coast, the Pacific Northwest) is needed to yield comparisons across North America. Longitudinal studies should also be conducted in the coming years to determine whether the analyses reported herein are long-term trends or short-term needs. By tracking information skills over time, it will be possible to forecast which skills will likely be needed in the near future, which are in current demand, and also which skills are quickly falling out of favor among employers. Such research will assist universities in development of local courses as well as national MIS curricula to meet the dynamic needs of employers and employees in the next millennium.

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