

Skills in the MIS Job Market

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ABSTRACT

With the current turmoil in the U.S. economy, it is more necessary than ever to ensure that graduates and employees have the skills necessary to compete in the job market. Previous research has looked at job advertisements in print and online media to determine skills that employers were seeking. That research has allowed only a relatively small sample of the jobs currently available to be analyzed. This research uses a web content data mining program which has obtained one quarter of a million U.S. job advertisements for information technology degree graduates from various job websites. The web content mining program then extracted the skills mentioned in those job ads for subsequent analysis.

Keywords (Required)

Job Skills, Careers, Job Markets.

ECONOMIC UNCERTAINTIES AND THE MIS JOB MARKET

Turmoil in the U.S. financial market implies considerable uncertainty for the job market as many organizations have decided to limit their hiring. Faced with the possibility of limited hiring, it is even more important for MIS professionals, MIS students, and MIS academic curriculum planners to carefully consider the portfolio of skills they have to offer. This paper reports the results of a study of the most highly demanded job skills in the current MIS job market including technical, business and soft skills and contrasts those skills to the demand for technical skills previously reported for IT jobs such as in Prabhakar et al. (2005).

DATA COLLECTION METHODOLOGY FOR THE MOST DEMANDED MIS JOB SKILLS

In 2005, Prabhakar et al. reported technical skill requirements for the overall IT market in light of the widely publicized threat of outsourcing and offshoring. The findings were an early indication of the skills that would be in demand in the overall IT job market. At the time, the limited sampling methodology did not allow specific focus on MIS. The current research is based on a much more comprehensive sampling methodology and enables a focus on what skills are currently sought in the MIS job market. A classification scheme based on the skills advertised on the Internet during the study period was developed based upon prior research. These skills are tuned to today's job market from a taxonomy of Internet job advertisements from Monster.com in 1998 (Prabhakar, Litecky, & Arnett, 2005), an earlier taxonomy by Trauth et al. (1993), and even earlier research on job skills in ads in newspapers (Athey & Plotnicki, 1988).

As a first stage, job advertisements were selected by a custom spider (Litecky, Aken, Ahmad, & Nelson, 2009) from three large U.S. job web sites (Monster.com, SimplyHired.com, and HotJobs.com) which specified IT-related degrees (CS, MIS/CIS, and IT). During the study period of 2007-2008, more than nine hundred thousand IT job ads were collected from these sites. Not only because of the voluminous sources but also due to the extent of the sample, the data used in this research is believed to be representative of the current U.S. advertisements for employees with IT-related degrees. The primary concern of the authors, however relates to the skills sought by employers of MIS graduates. Therefore, the ads specifically requesting MIS degrees (those mentioning degrees in "MIS", "CIS", "Management Information Systems", "Management of Information Systems", or "Computer Information Systems") were extracted, restricting the sample size to approximately 218,000 job ads.

For the subsequent data mining of the job ads, a thesaurus of technical terms for identification and description of job skills were built based upon previous research regarding technical skills demand (Prabhakar, Litecky, & Arnett, 2005; Trauth, Fanvell, & Lee, 1993). These were combined with soft skills and business skills from Aken & Michalisin (2007) and skills listed in the U.S. Department of Labor's O*NET database (2008) for a total of 1,717 skill search terms. Lexical search software developed by the authors analyzed the frequency of use of these terms in the job ads.

SKILLS IN MIS JOB ADS

All data shown in the rest of this paper is based upon the skill frequencies in the MIS job ads. The types of skills were grouped into three broad categories: Business skills, Soft skills, and General Technical skills. Technical skills were further broken down into: Application development skills, Database management Skills, Programming skills, System Administration Skills, and Networking skills. These classifications are based on job definitions in Litecky et al (2009). Business skills included such items as strategy, project management, finance, accounting, marketing, etc. Soft skills included terms for leadership, responsibility, communications, initiative, etc. General technical skills included security, programming, certification, software development, etc. There were multiple synonyms for many terms which were counted as a single skill (e.g., VB is considered a synonym for Visual Basic in this context). Obviously, with 1,717 skills being extracted, only those which are most frequently mentioned will be discussed in this paper.

Business Skills

As shown in Figure 1, Business Skills, a wide range of business skills for MIS employees is sought. Skills which appeared in over 10 percent of ads are shown. Of these skills, the most important, as measured by frequency, is the managing/supervising skill. This skill was required in 45.83% of the ads. This high level of importance matches the skills identified by prior interview-based research (Goles, Hawk, & Kaiser, 2008), which expresses opinions voiced by industry leaders and is consistent with the emphasis placed on these skills in many MIS programs located in schools of business.

Financial skills were also of high importance, appearing in over 37% of ads. Perhaps the importance of this skill is prescient of or related to the regulatory environment put into place in the early part of this decade and can be expected to continue in light of the current financial market turmoil that has highlighted the need for additional financial controls. With the breadth of its occurrence across a wide variety of job advertisements, inclusion of fundamental financial coursework remains an important curriculum need.

An additional set of skills had considerable importance including Business Process Redesign and Re-engineering (24.51%) and Marketing (14.04%). This, along with the Financial skill, seems to re-iterate the need for graduates of MIS programs to have a broad knowledge of fundamental business concepts. The need for Enterprise Resource Planning (ERP) skills from the General Technical category (see Figure 3) probably impacted the reason for the Business Process Redesign (BPR) skills. Supply Chain Management and Human Resources were mentioned in about 10% of the job ads. Many more technically-oriented MIS professionals may not possess these skills and might consider retooling in these areas. For many of these professionals, this implies business-oriented training or perhaps pursuing an MBA.

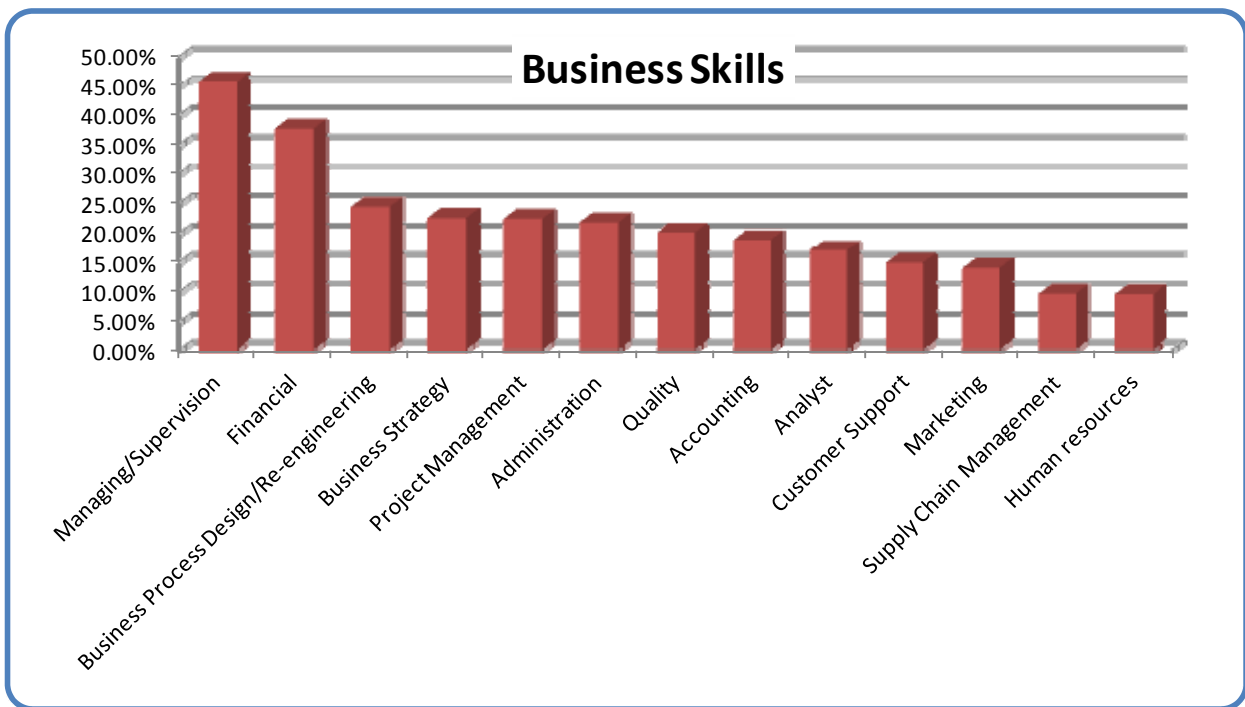


Figure 1: Business Skills

Soft Skills

As shown in Figure 2, Soft Skills, almost 30 percent of the jobs demanded Leadership skills followed by significantly lower requirements for Problem Solving, Responsibility, Innovation, etc. The overall demand for soft skills in these ads is fairly low relative to many of the other skills in this research as those skills are more often emphasized in face to face interviews (Litecky, Arnett, & Prabhakar, 2006). Yet, when IT managers are consulted as in interview-based research studies, many of them have indicated the importance of such soft skills (Goles, Hawk, & Kaiser, 2008) even though it is often less frequently mentioned in ads.

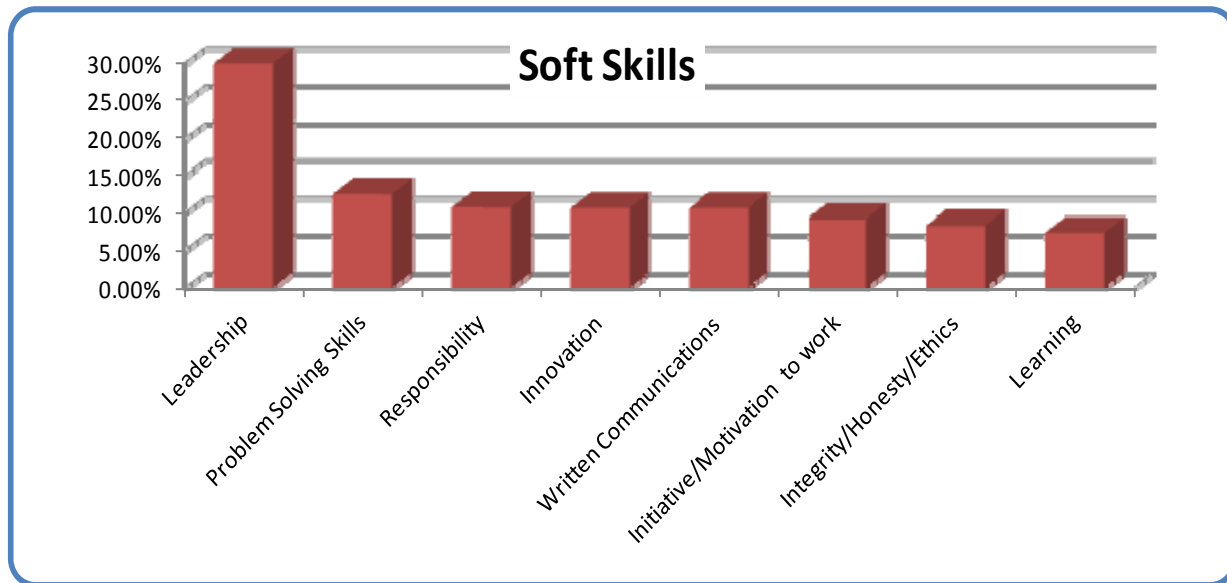


Figure 2: Soft Skills

General Technical Skills

Figure 3, General Technical Skills, illustrates the overall general technical skills mentioned in at least ten percent of the ads. Within this category, Systems Integration is the most frequent skill specified in the job ads and this is closely followed by Security skills. The systems integration demand may imply a strong emphasis on component based information systems such as Service Oriented Architecture based systems. The emphasis on general security skills would seem to indicate the increasing requirements for security-related knowledge across all functional areas of MIS. Programming is itself less frequent and more details on specific language skills are included in the next subgroup. Previous research has generally shown programming skills to be the most important of all technical skills among IT jobs (Prabhakar, Litecky, & Arnett, 2005). Yet here, with interest restricted to MIS jobs, there is less demand for programming skills. Surprisingly, Office Applications are demanded slightly more frequently than general references to programming which implies that this is a prerequisite skill for many MIS personnel. Although frequently dropping out of most discussions of MIS-oriented skills, Computer-Aided Software Engineering (CASE) Tools are still of significant importance to many employers. Of the enterprise-level software packages, Customer Relationship Management (CRM) and Enterprise Resource Planning (ERP) software are also important to many organizations (although mentions of specific CRM and ERP software packages were fairly sparse).

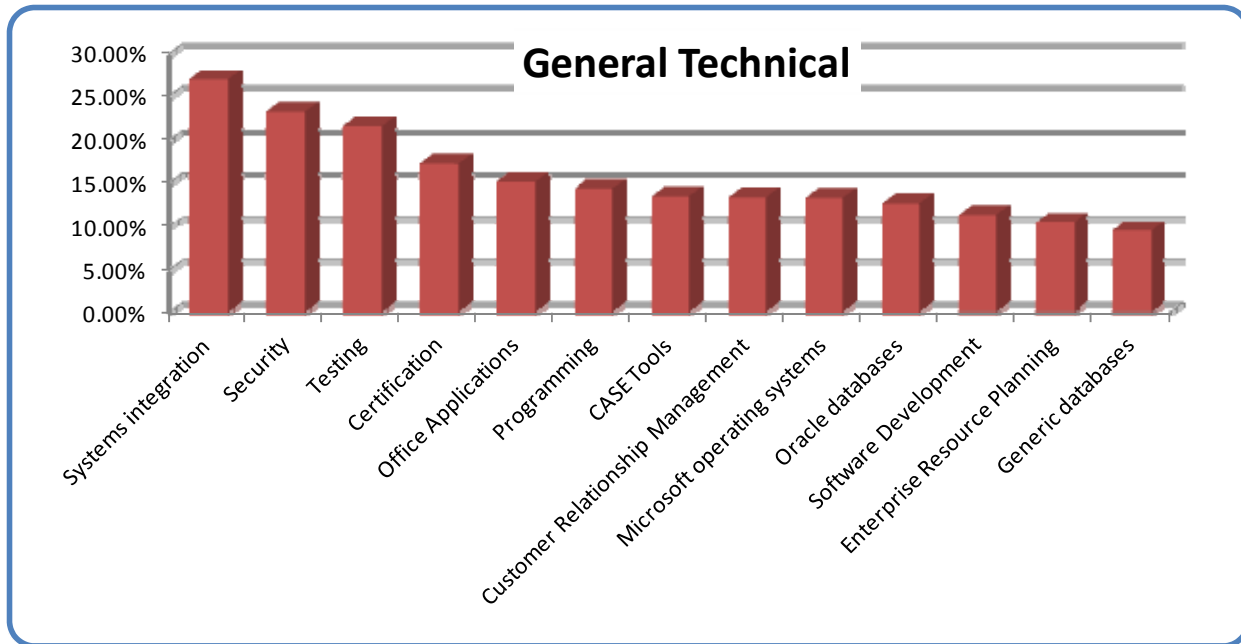


Figure 3: General Technical Skills

Many MIS professionals already have an inventory of skills in these general areas yet the demand for certification illustrates the need to document those skills. Vendors of industry certifications from not-for-profit organizations such as the I.C.C.P. (Institute for Certification of Computer Professionals) are all good investments in documentation of skills. In some areas such as Security, industry certification may be required to hold or continue in a position. And, although only about 16% of the job ads mentioned certification, almost 50% of the job ads mentioning security also mentioned certification. Thus, MIS professionals in areas such as Security should consider getting the requisite certifications in order to boost value to their current and future employability.

Application Development - Programming

As illustrated in Figure 4, Programming Language Skills, the frequency of demand of specific programming language skills for MIS personnel is not very high compared to the other skills discussed. This may indicate less demand on MIS personnel for programming roles. With relatively high frequencies within this category for Web-oriented skills (e.g., HTML), it seems that many employers at least have an expectation for MIS personnel to be able to at least perform some website development or maintenance. Frequent mentions of SQL also indicates the relative importance of database development, management, or maintenance by MIS personnel. Of the functional and object-oriented application development languages, Java is most frequently mentioned. This is in stark contrast to the programming language skills mentioned for Computer Science graduates (Aken A. , 2009) where C/C++ and Java are almost evenly mentioned. This may indicate less of a need for in-depth application development by MIS personnel, but rather a fundamental understanding of programming concepts or some rudimentary applet development or maintenance. Many other programming skills were observed at relatively low levels overall indicating that even relatively scarce programmer skills exist in niche job markets but without any overriding clear favorite. MIS professionals and student aspirants should be aware of these frequency differences and diversity and should avoid being type-cast as having a single type of proficiency in order to maintain reasonable levels of marketability.

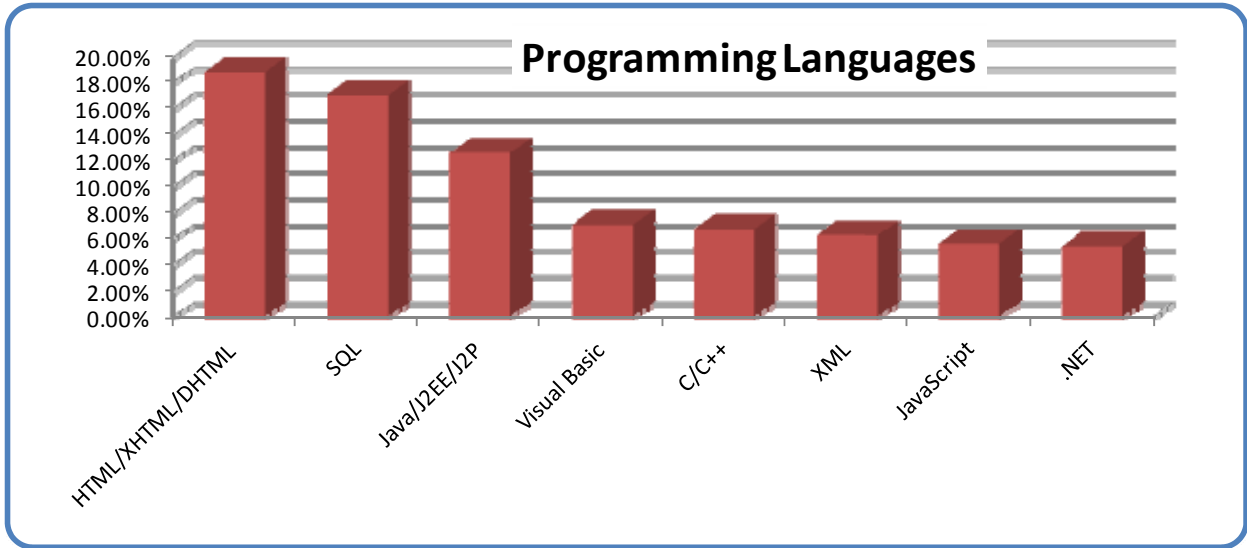


Figure 4: Programming Language Skills

Database Management Skills

In Figure 5, Database Skills, SQL skills have already been discussed in the context of the other programming skills. Among the vendors, skill with Oracle is still in a commanding level of demand. Generic databases simply represent the term without a vendor indicating a general skill being demanded without specifying a particular brand of database product. Demand for Microsoft databases is at about half of that for Oracle and in no way seems to threaten Oracle’s lead. The term “database administrator” or “database administration” without mention of vendor occurred in slightly more than four percent of the MIS ads. IBM database skills are only at about two percent and are even outscored by data warehousing, database design and data modeling ads. Open-source database demand was too low to fit within the cutoff for this graph and perhaps shows a lack of adoption by enterprises. MySQL is included in the open source databases skill indicating another database that is frequently claimed to have a higher level of popularity but apparently not with employers of MIS personnel as it occurred in less than two percent of the ads. The implications for MIS professionals and students are fairly clear: competency is needed in SQL and Oracle along with some level of generic and Microsoft database skills combined with knowledge of database administration.

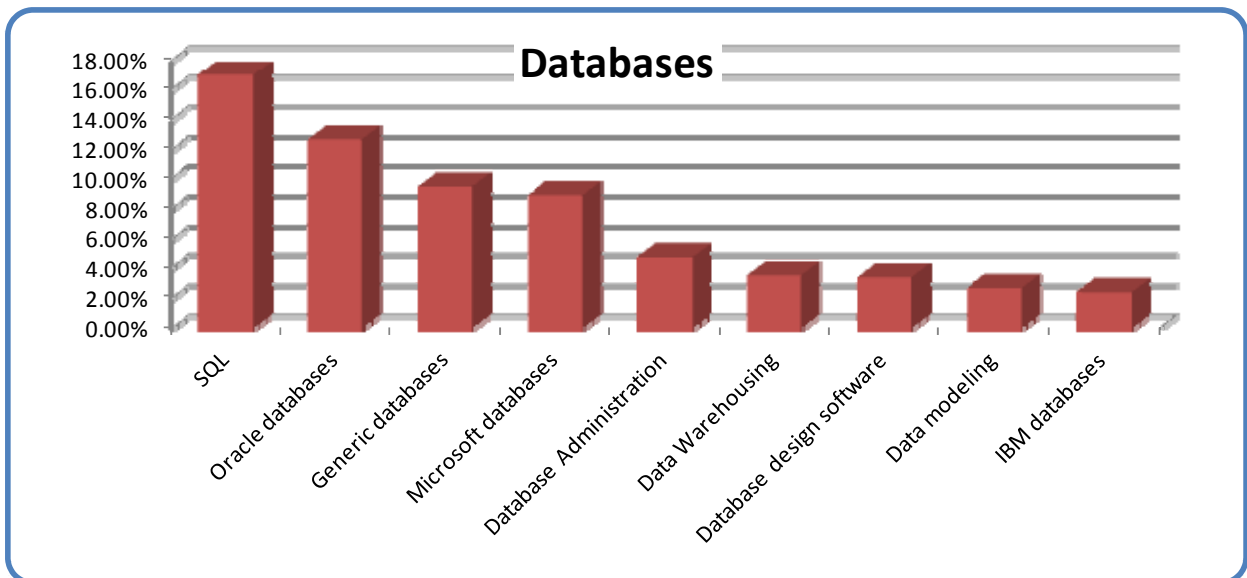


Figure 5: Database Skills

System Administration Skills

In Figure 6, Systems Administration Skills, demand for Microsoft operating systems skills is shown with a commanding lead in frequency over any other OS. UNIX operating systems are shown as much lower at about 8%. Open-Source operating systems (e.g., Linux) occurred slightly less frequently than UNIX but are in more demand than Sun or IBM’s specific versions of UNIX. Operating systems, computer servers, web application servers, and system administration skills without specification of vendor are also relatively infrequent. Here the skills of the MIS professional must definitely cross vendor lines as the skills demanded are from multiple vendors.

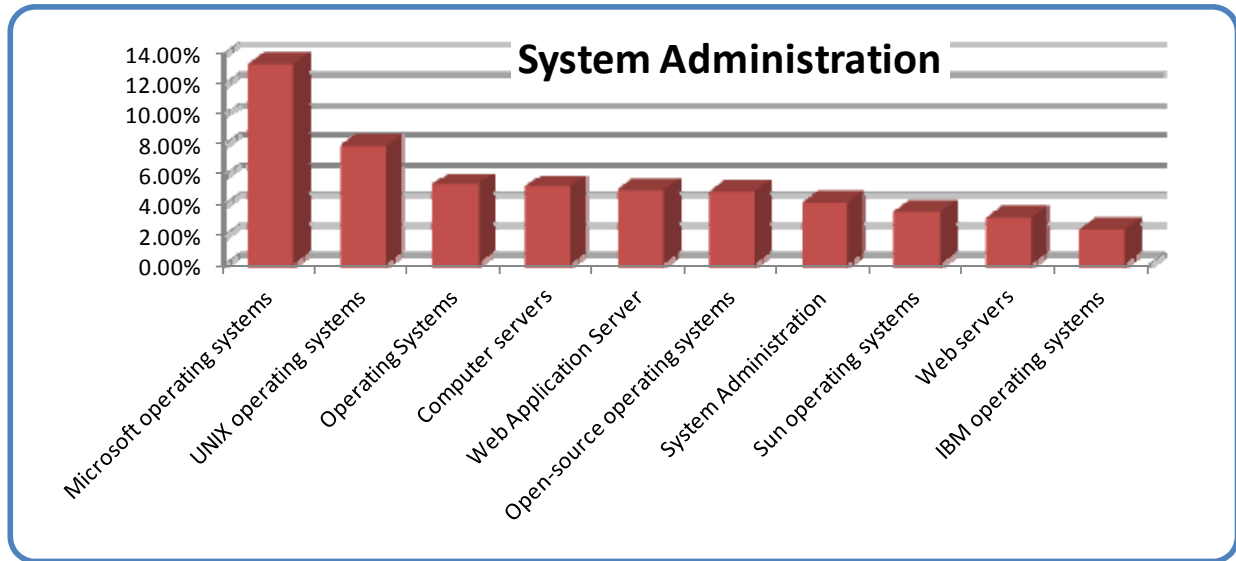


Figure 6: System Administration Skills

Networking Skills

Figure 7, Networking Skills, differentiates networking from system administration skills (as shown in Figure 6) with major requirements for skills of Voice/Data Telecom and Cisco at about 6% of MIS ads. General networking administration skills are mentioned in about 4% of MIS ads. Specific network administration software packages were mentioned collectively almost as frequently as the generic skill. Consequently, MIS personnel need at least familiarity if not some capability of supporting other personnel in this area.

CONCLUSION

In general these results support educational curricula design and labor market searches for employees and employers. Educators can use these results as an aid in developing curricula better attuned to the MIS labor market. Similarly students and displaced IT workers can use the data as an aid in making their choices of courses to fit labor market demands. Employers might use this data to compare their companies’ inventory of job skills to those demanded and popular in the labor market.

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