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Soft Skills versus Technical Skills: Finding the Right Balance for an IS Curriculum

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ABSTRACT

Continuous improvement and development of a curriculum is an essential part of the success of information systems academic departments. In the current study, we facilitated focus group sessions with information technology executives to identify the critical skills they seek when hiring entry-level MIS graduates. The results follows the general trend that has recently been seen throughout the IT industry, as seven of the top ten skills were soft in nature, two were system skills, and only one could be accurately categorized as highly technical in nature.

Keywords

Knowledge, skills, and abilities (KSAs); focus groups; nominal group technique; qualitative research; AIS Model Curriculum.

INTRODUCTION

Ongoing curriculum development is an essential part of the well-being of information systems (IS) academic departments. One key aspect of curriculum reviews is consideration of employment opportunities and career success. Alignment of Information Technology (IT) curriculums with the skills desired by industry is continuing to be a difficult task for academics as the IT environment is constantly changing, and once a skill is mastered it many times is already obsolete (Lee and Lee, 2006). It is this rapidly changing environment that has lead to an apparent shift in the skills that recruiters prefer. In the past, recruiters tended to look for mostly traditional technical skills, but now recruiters are looking for a better balance of soft skills (e.g., social abilities, such as interpersonal skills). With the desired skills frequently changing, it is not surprising that research shows a persistent gap between knowledge/skills taught in academia and those that are demanded by the IS industry (Fang, Lee, and Koh, 2005; Lee, Trauth, and Farwell, 1995; Nelson, 1991). For example, in a 2005 study, IS recruiters reported that interpersonal and personal skills are more important than any other attribute, including technical skills (Fang et al., 2005). This study also showed that the gap in demand for interpersonal skills versus other skills is continuing to widen.

There is no question that a significant gap exists between academia and the IS industry. Complicating the efforts to uncover the causes for this gap is the fact that studies have been unable to come to a consensus on the critical knowledge/skills (Whitten, 2008). Each study comes up with its own list of skills, but no consensus is reached. Our study, and similar studies, are not trying to simply identify a set of skills which can be agreed upon by IS academics and IS professionals, but also to identify the causes for the persistent gap. The 2002 study conducted by Lee, Koh, Yen, and Tang, identified the ineffectiveness of the IS education system as one of the root causes for the persistent gap. Another study conducted by Rada argues that one potential cause of the gap may be the lack of development of IT skills standards (1999). Rada argues that the IS industry should take a path similar to the healthcare industry in which each educational institution has its own established competencies. We intend to build on these findings, and to continue to attempt to shrink the gap between academics and practitioners.

Academic studies have been attempting for many years to find the right balance of technical and soft skills in developing an IT curriculum. Analyzing trends in the industry is critical to developing an IT curriculum in academia and to the continuous improvement of the curriculum. The source of the data for our current study is an IS academic advisory board, a practice which is highly recommended to help align the information system curriculum with the needs of industry and graduates. Academic advisory boards must meet frequently to assess the curriculum so that it stays current and relevant (Cappel, 2001; Fang et al., 2005). Although it seems simple to execute a curriculum based on trends in the industry, credit hour limitations

and a lack of resources create further challenges (Braun, Crable, and Tesch, 2003). Finding the right balance is very difficult, as technical skills are often needed to transition into the work force, but too much focus on technical skills might hinder later advancement into managerial positions (Plice and Reinig, 2007).

Research like our current study helps academic stakeholders identify trends that are occurring in the IS industry, and the more research that is conducted adds credence to the development of a new curriculum based on trends. This study hopes to build on the work of past research, using a focus group of IS professionals to re-affirm past findings and to identify possible new trends. In past research, the focus of the research has often been on the skills required for specific IS positions (e.g., computer programmer [Bailey and Mitchell, 2006]; and CISO [Whitten, 2008]) and these results were used as a framework for creating an IS curriculum. This current study builds on the work of Fang, Lee, and Koh (2005), which looked at all entry-level IS positions, rather than focusing on specific professional positions.

BACKGROUND/LITERATURE REVIEW

The literature on this topic tends to agree that the IT job market increasingly demands soft skills and business skills. This has led academia to focus their curriculums on core skills rather than mainly technical skills. The degree to which curriculums should shift, however, is very debatable, and research supports many possibilities.

Plice and Reinig (2007) discuss the possibility that, even though soft skills are highly demanded for advancement into management positions, universities could help their students stand out to employers for entry-level positions by focusing more on technical material. Focusing a curriculum more toward technical skills would allow graduates to align their skills better with job requirements for entry-level positions, thus setting them apart from the competition. However, the question must be asked: what type of position does a university wish to prepare its students for? Entry-level IS positions or IS management positions? It does not appear that a university would be known as a top-tier institution just for preparing students for entry-level positions. The results of their research showed that IS graduates from this institution highly valued the business aspects of their curriculum, and those skills are what have sustained successful careers (Plice and Reinig, 2007).

Another recent study conducted by Bailey and Mitchell (2006) suggests that, although an eclectic mix of skills is needed, technical and soft skills are viewed as more critical than specific business skills. These findings are a bit contradictory to the previous study discussed, as the importance of business skills is downplayed compared to technical and soft skills. However, their study focused specifically on computer programmers, so the importance of technical skills over business skills for programmers is likely different from a more general IS position. Bailey and Mitchell suggest diverse skill sets needed by the 21st century IT professional team, flexibility, change management, creativity, interpersonal, communication, problem solving, conceptual, strategic management, continuous improvement, and technical skills (Bailey and Mitchell, 2006; Buhler, 1997; Cappel, 2001; Gupta and Wachter, 1998; Kendall and Kendall, 2002; Lee, 2005; LeRouge, Newton, and Blanton, 2005; Nakayama and Sutcliffe 2001; Schenk, Vitalari, and Davis, 1998; Shah and Martin 1997).

The research by Fang et al. (2005) on skills needed for entry-level IS positions found that all interpersonal and personal skills/traits (e.g., teamwork, critical thinking) are viewed by recruiters as the most important attributes for new entry-level IS employees. Based on this research, even entry-level IS positions demand strong personal and interpersonal skills, and basing a curriculum on technical skills will not only set students behind for IS management positions but for entry-level jobs as well. This study categorized skills into four groups: Core IS Knowledge, Organizational, Interpersonal (Group) Skills, and Personal Skills. Although this is one way to analyze IS skills, it does not tie well to a set of IS courses. Hence in our research, we used the categorization scheme which is shown in Table 1.

Lee's (2005) study contributes a framework of IS skills, which builds on Todd, McKeen and Gallupe (1995). This framework (see Table 1) can be used as a basis for future research and as the building blocks for a university's IS curriculum. These skills were compiled through the study of Fortune 500 companies, which makes it quite useful as Fortune 500 companies tend to lead in the demand for top IS labor (Lee et al., 2005).

TECHNICAL SKILLS **Category/** Skill Requirement **Architecture/Network** • Internet • Client/Server • General Architecture/	**BUSINESS SKILLS** **Category/** Skill Requirement **Business** • General Business • Function Specific • Enterprise-wide	**SYSTEM SKILLS** **Category/** Skill Requirement **Problem Solving** • General Problem Solving • Analytical/Logical

• Network • Networking & Devices • Mainframe • Security • LANAVAN **Hardware** • Server • General Hardware • Desktop/PC • Devices/Printers/Storage **Software** • Database • Packages • Operating Systems/ • Platforms • General Software • Programming Languages • CASE	• Industry Specific • Electronic Business **Management** • Organizational Skills • Project Management • Planning • Leadership Skills • Training • Monitor and Control • General Management **Social** • Communication Skill • Interpersonal Skill • Independent/Self- • Motivated	• Adaptive/Flexible • Technical Expertise • Customer-Oriented • Quantitative • Modeling • Creative/Innovative **Development** • Analysis • Implementation • General Development • Design • Operations/Maintenance • Programming • Documentation • Development • Methodologies • Integration • Quality Assurance • Knowledge of Technological Trends

Table 1. Lee (2005) adapted from Todd et al. (1995, pp. 25-26)

Building off the above framework, Lee and Lee (2006) analyzed the skills required of IT managers. Using the same technique of analyzing skills through analysis of job ads from Fortune 500 companies, Lee and Lee made profound discoveries. The key contribution from their research is that an IT manager needs both technical and soft (i.e., behavioral,) skills, and neither technical nor soft skills should be looked at as most important, because both are needed (Lee and Lee, 2006). Using this research, academia should continue to monitor trends, but be cognizant that too much focus cannot be given to technical or soft skills alone if we want our graduates to successfully advance in their careers.

METHODOLOGY

Working with our IS Advisory Board afforded us the opportunity to solicit their input about our curriculum. This board consists of experienced IT/IS executives, such as CIOs, and consultants, mostly from our metropolitan area. Two focus groups sessions were held in October, 2007; Group 1 consisted of four participants and Group 2 included five participants. The groups discussed the following question, "What knowledge, skills, and abilities does your organization expect or desire from graduates with a major in Management Information Systems (MIS)?" The study was conducted using a modified structured approach. This approach was executed in four main phases: 1) Individual item generation, 2) Round-robin listing and discussion, 3) Individual rating of items ("critical" versus merely "important"), and 4) Ranking the critical items.

This qualitative approach is a good method to collect rich data as the focus group moderators are able to not only examine the compiled data but are also able to examine the emotions of respondents. Thus our study builds on past studies which were conducted primarily through the use of surveys. The field study consisted of a series of focus groups undergoing a nominal group process (Delbecq, Van De Ven, and Gustafson, 1982). An underlying assumption of the method is that individuals who perform a task can provide valuable insight into the important factors influencing their ability to achieve a high level of productivity when performing the task. This method has been used successfully in several domains including systems development (Havelka, 2002; Havelka, Sutton, and Arnold, 1998; 2001).

In the current study, this method was used to identify knowledge, skills and abilities (KSAs) that our Advisory Board would like to see our MIS graduates possess. The nominal group technique used in the focus groups is a modification of procedures developed by prior research in the social science (Delbecq et al., 1982).

RESULTS

The two focus groups resulted in a long list of skills and abilities that organizations desire from IS graduates. Each respondent had their own unique feelings on the importance of certain skills, and each focus group had significantly different rankings of skills desired. However, respondents tended to agree on the importance of several skills, and the top ten skills from the study are listed below.

1.	Demonstrated leadership skills (teams, internships, projects etc), demonstrated leadership ability
2.	Problem solving / innovative /creative thinking; Good problem solving skills
3.	Intense interest in applying technology to solve business problems (passion for field); Demonstrated higher energy level, passion, enthusiasm (drive, ambition)
4.	Strong written and verbal communication skills; Written and verbal communication skills
5.	Interest / ability to work in a team environment; Team/Collaborative
6.	Proven ability to manage multiple priorities / multi-tasking
7.	Business fundamentals - what is ROI etc; Financial analysis skills (business case, value)
8.	Analytical skills; Probing and analysis skills
9.	Understanding business process thinking: Business process knowledge (Supply Chain, Finance)
10.	Knowledge of data management: data gathering, storage, retrieval, analysis), Database

Table 2. Top Ten KSAs from Current Study

This list follows the trend that has been seen throughout the IS industry, as seven of the top ten skills were soft in nature (i.e., Skills 1, 3, 4, 5, 6, 7, 9) and two were system skills (as defined by Lee & Lee [2006]). The results not only show that the trend is continuing, but it appears that the focus in the industry on technical skills is becoming even less of a factor in hiring decisions than prior research showed. The list of the top ten skills has only one technical skill, *Knowledge of data management,* and even this skill is not overly technical. Whether these results are indicative of a new shift in the required skill set is of course, debatable, and further research will always be useful for identifying trends.

Using the framework for organizing skills which was developed by Lee and Lee (2006), the skills identified in our study were grouped into the same three categories.

TECHNICAL SKILLS	**BUSINESS SKILLS**	**SYSTEM SKILLS**
Software	***Management***	***Development***
• Knowledge of data management: data gathering, storage, retrieval, analysis), Database • Technical depth (demonstrated depth in at least one technical area) (Quantitative analysis, database, app development, network) • Understanding of current development languages (programming language) + tools; not experts, but some knowledge • ERP -general (SAP) • Business Intelligence	• Demonstrated leadership skills (teams, internships, projects etc), demonstrated leadership ability, 2A • Proven ability to manage multiple priorities / multi-tasking • Project management; PM planning skills, 2X • Communication planning	• System development-Life cycle understanding • Exposure to technology (prog, testing, QA, methodologies) • ITIL • .dot .NET exposure/ experience
Architecture/Network	***Social***	***Problem-Solving***
• Systems architecture-high level understanding various	• Intense interest in applying technology to solve business problems (passion for field); Demonstrated higher energy level, passion, enthusiasm (drive, ambition), 2F	• Problem solving / innovative /creative thinking; Good problem solving skills, 2M • Analytical skills; Probing and analysis skills (not taking surface), 2Q • High mental acuity

components, Infrastructure (2AU) • Broad knowledge of enterprise/ business architecture • Web arch / tech • Network concepts - converged NW (voice, net, data, video) • IT security compliance (PCI, litigation holds, sox) • Application Architecture • Exposure to internal controls and data security ***Hardware*** None	• Strong written and verbal communication skills; Written and verbal communication skills, 2H • Interest / ability to work in a team environment; Team/Collaborative, 2D • Positive Attitude • Trust-accessing their trustworthiness- Integrity • Ability to accept changes (flexible, adaptable) • Accountable (remote work, delivers) • Ability to subordinate personal (low ego) to needs to organizational needs • Organizational skills • Client or service focus • Poise and professional presence ***Business*** • Business fundamentals - what is ROI etc; Financial analysis skills (business case, value), 2AM • Understanding business process thinking: Business process knowledge (SC, Finance, O-Z-C), 2S • Practical experience / Demonstrated ability to build, modify, configure and support a technical solution, Relevant real-world experience in the field • Big picture knowledge & knowledge of strategic plans; Understanding of need for alignment with business goals (not just tech), 2T • International / global (design, management, rollout) • Understanding the IS function (to support business) • Ability to make cogent business case	• Critical thinking-asking 5 whys • High potential • Ability to follow process (methods) • Conceptual skills / big picture • Enjoys doing research (resourceful) • Statistical process control (collect data, process improvement)

Table 3. Lee and Lee's Model Populated with KSAs from Current Study

The breakdown of skills only adds further credence to the premise that technical skills are less demanded, as there are more business skills listed than system and technical skills combined. Therefore, soft skills appear to encompass not only the most important tasks, but these tasks also make up a larger portion of an entry-level IS employees overall duties.

Although this study used the skills framework developed by Lee and Lee (2006), our findings appear to be a bit different from their study. Lee and Lee thought that IS managers' roles would be managerial and business oriented rather than technically oriented. However, the results of their study showed that IS managers do in fact devote a good portion of time to technical tasks, especially computer networking, client/server, mainframe, and security. If the ranking of skills is in fact an indication of the importance of certain skills to a IS professionals role, then our study shows a much lower level of importance for technical skills.

The findings of these two studies are opposite of what might be expected; if anything, it appears that technical skills would be more important to an entry-level IS professional than to an IS manager. As Plice and Reinig (2007) point out, entry-level IS professionals should focus more on technical skills for those are the skills needed to transition into entry-level IS positions.

Our findings are in line with the skill set developed by Cappel, Prybutok, and Varghese who study non-technical skills fundamental for success in IT (2005). However, their study put added emphasis on the soft skill, attention to detail (ATD), and argues that ATD is a skill which is not adequately recognized in the IT community. The KSAs our study outlines require a high degree of ATD, but ATD is not explicitly identified as a demanded skill.

The next skill set which is comparable to our study is Andriole (2007) whose research identifies many of the skills which our study recognized as important. However, instead of clearly outlining the skills, this study applied them to the seven habits practiced by technology leaders. The seven habits include building business scenarios; tracking technology that matters to business; identifying business pains and pleasures; organizing adaptively; managing infrastructure cost-effectively; communicating well and often; and marketing. Being able to execute these habits requires many of the skills we outline, and the more skills a technology leader has the easier it will be to execute these habits more effectively.

Focus group findings such as those found in this study are used to adjust the IS curriculum at Miami University to better match the skills desired by professionals in the IS industry. The current curriculum at Miami University is shown below, with the Association for Information Systems (AIS) Model Curriculum (AIS Model Curriculum) provided as well as a point of comparison. Our curriculum has many of the same courses that are recommended in the Model Curriculum (although we have packaged them with "sexier" names per suggestion of our Advisory Board). It appears that, if our curriculum is lacking in any area, it is in the breadth of electives offered. The Model Curriculum recommends offering 11 electives, but our curriculum only provides six electives for students to choose from. Our curriculum does focus more on web-based applications than the Model Curriculum suggests, thus providing students an opportunity to demonstrate technical depth of knowledge as also suggested by the focus group results.

Miami University Curriculum
Core IS Topics
• IT & the Intelligent Enterprise
• Building Web-Based Applications I
• Building Web-Based Applications II
• Data Communications in Business
• Designing Business Systems
• Database Systems and Data Warehousing
• IT Project Management
Electives
• Fundamentals of Programming and Problem Solving
• Enterprise Systems
• IT Risk Management, Security, and Audit
• Electronic Commerce
• Knowledge Management
• Managing the Intelligent Enterprise
AIS Model Curriculum

Core IS Topics
• Foundations and Role of IS
• Enterprise Architecture
• Data & Information
• IS Strategy, Management and Acquisition
• Systems Analysis & Design
• Project Management
• IT Infrastructure
Electives
• Application Development
• Enterprise Systems
• IT Audit and Controls
• IT Security and Risk Management
• Knowledge Management
• Data Mining/ Business Intelligence
• Information Search and Retrieval
• Collaborative Computing
• Human-Computer Interaction
• Business Process Management
• Social Informatics

Table 4: Comparison of Curricula

LIMITATIONS OF OUR STUDY

The key limitation of our study is that it has a distinctive Midwestern US focus. Moreover, our students are highly sought after for their polished skill sets in general, which is one reason our IS Advisory Board is willing to give us their time and other resources. Hence, they would likely naturally want students with strong social skills.

CONCLUSION

The shift in the IS industry to soft skills could help explain why there has been a reduction in MIS majors nationwide. For example, at Miami University there has been a 75% reduction in the number of MIS majors over a five year span. We contend that this could be occurring because technical skills are not as highly sought after, so students with technical skills may opt to just get an MIS minor. By minoring in MIS, the student could possibly be more in touch with skills that are required to be an IS manager. Also contributing to the contention that an MIS minor may suffice is that during this period where MIS majors have dropped greatly, the number of IT professionals employed reached its highest mark since the early 2000's in the second quarter of 2005 (Fang et al., 2005). So, even though MIS majors are dropping, IS professionals are still highly demanded. Thus, for future research, we would like to study whether or not students are indeed opting for MIS minors instead of majors, and, if so, why?.

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