An Examination of Employers' Perceptions and Expectations of IS Entry-level Personal and Interpersonal Skills

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Abstract

Employers hiring entry-level information systems personnel have expectations about the entry-level expertise in a number of skill/knowledge areas including interpersonal and management, technical, and general business specialties, in addition to established organizational hiring guidelines. Furthermore, based on recent experience, these same employers have perceptions of the delivery of this requisite skill base. In an effort to increase (or improve) stakeholder relationships between IS hiring organizations and 4-year liberal arts institutions, we introduce a framework for examining skill requirements from the employer's perspective. Derived from discrepancy theory, the framework concedes that employers hold a variable set of expectations for entry-level IS skills as well as a perception of skills of recently hired entry-level personnel. This paper examines differences in expectation and performance and describes the impact of this discrepancy on the IS entry-level hiring process and the incorporation of this information into curricula at schools of higher education.

Keywords: IS skills, Entry-level IS skills, Interpersonal skills, MIS Curriculum

1. INTRODUCTION

The skills for success in the field of Information Systems are constantly changing. Consequently, these evolving skills must be incorporated into the Information Systems curricula at schools of higher education. Periodic assessment of skill requirements is essential if business schools are to match their curricula with skills that are necessary in the field.

The importance of the IS professional skills has been widely examined in the literature, primarily from the perspective of perceived importance (Green, 1989; Weber et. al. 2001). Skill categories examined in the literature have followed similar categories over the years (Weber et al 2001 ; Lee et al

,1995; Bryd and Turner, 2001). This research indicates that the requisite skill base of IS professionals categorizes IS skills according to 1) technical skills; 2) business functional skills; and 3) interpersonal and management (behavioral) skills. In fact, managerial, business, and interpersonal skills have become increasingly cited as mandatory for these employees (Bryd and Turner, 2001; Gupta and Wachter, 1998;), Lee et al, 1995), often exceeding the requisite level of technical skills. Lerouge et al (2005, p. 12) discussed the need to "minimize gaps through such means as matching employee skill sets and motivational orientations to the skills required to successfully exploit modern technologies."

To examine desirable personal and interpersonal/management skills required of entry-level employees, we introduce a framework derived from discrepancy theory and previously applied in Tesch et al (1993). This framework allows that stakeholders (i.e. employers) hold a measurable set of expectations for the skill categories under investigation and also have a perception measure of how that skill category is being met. The "perceived" discrepancy between expectations and performance lends itself to discussion of methods for narrowing the gap when expectations are significantly greater than performance levels.

This view of both the expectations and perceived delivery of interpersonal and personal skills from the employers' perspective allows a unique look at some important questions in skills studies: What importance do employers of entry level IS hires place on personal and interpersonal/management skills? How do these employers view the skills held by recent entry-level hires? For existing discrepancies, what impact should these have on schools of business IS curriculum decisions? Examination and recognition of this expectation (perceived performance discrepancy) may exert a strong influence on IS curriculum decisions as enrollments of IS majors continue to decline. Results of such an investigation will introduce a new perspective for consideration when making curriculum decisions.

The purpose of this study is first to investigate the perceived importance (measured as the expected entry level expertise) of personal and interpersonal and management skills for entry level information systems/information technology (IS/IT) employees and the observed level of expertise for recent entry level hires. Subsequently, the study will explore the gaps between the perceived and observed skill measures. In the next section we review the literature and offer a theoretical foundation for the hypotheses. This review is followed by the research methodology, data analyses, and results. Last, a summary of the findings and implications for IS faculty and researchers are discussed.

2. LITERATURE REVIEW

Managing and Assessing Change

There is some agreement among IS professionals concerning the nature of pressure to keep up with the amount of change in the field. Lee, et al (1995) identified four types of pressure: changing technologies, changing business environment, the changing role of IS, and pressure to change curriculums. According to Lee, very few professions in human history have advanced as rapidly as computing technology has in the last several decades. As the business environment becomes more and more competitive, IS professionals are now also forced to go beyond their technical skill base and demonstrate to management the ability to cost-effectively analyze and support the appropriate computer technology to solve business problems. They suggest that IS managers act as internal consultants, emphasizing the relationship between IS and the users.

Technical and Business Skills

Technical skills are concerned with where and how to deploy which technologies effectively and profitably for meeting business objectives (Tesch et al, 2003). Studies outside of the USA have found differing results. A study by Yen et al (2005) found that Taiwanese professionals tend to focus more on the technical issues while American IT professionals were proficient in business melding, inter-personal communication and end-user training. Business functional skill sets incorporate organizational efforts to align information technology and business objectives. IS professionals require in-depth business functional knowledge to be able to re-engineer business processes, as well as to interpret business problems in order to apply

appropriate technical solutions (Hammer, 1990; Sullivan-Trainer, 1988).

A study by Davis, (2003) looking at job titles and tasks, found that new IS hires are doing tasks such as 1) providing technical and end user support, 2) installing software, 3) installing and maintaining computer devices, 4) managing information, 5) analyzing stages, and 6) maintaining and troubleshooting networks. The content areas that new hires indicated important were networking, troubleshooting, operating systems, database, and current issues in computer technology in order to meet the needs of these entry jobs. They also agreed that non-technical skills were important. This was consistent with employer ratings in the same study. As in other studies, both groups found that teamwork and the ability to think and reason were important to the success of their jobs.

A study by Medlin, Dave and Vannoy (2001) drew similar conclusions when identifying IT student opinions on skills necessary for success in entry positions. Their findings agreed that technical skills were indeed important but they recognized, as did their employers, that they need to have strong communications skills, analytical skills and managerial skills as well. Ehie's (2002) study indicated that employers are looking for individuals with strong systems orientations but also with a good understanding of integrative business value-chains.

Technology skills involving hardware, software, networking and systems development are basic requirements of IS personnel. However, today the typical linear career path of programmer to systems analyst to IS project manager no longer exists. Lee, Trauth and Farwell (1995) indicated that the student today will need to be prepared to move into more specialized fields and be able to adjust to rapid change. In addition, IS professionals will need to be knowledgeable in technology management in order to help organizations to develop competitive advantages and be able to develop future IT visions for their organizations. With this disappearance of a single career path, today's IS professional requires more breadth and depth of education across the technology, business and personal dimensions.

Chrylser and Van Auken (2002), in a survey of MIS graduates, found that after being in the workforce for more than one year graduates felt that courses about database retained the highest value, followed by software project management, structured systems analysis, system development and finally COBOL. Cappel (2001) surveyed employers and found that programming skills still remained an essential component to IS education (Visual Basic, C++ and Java were rated as the top three important programs). Liu, et al (2003) focused on the technical skills necessary for entry-level IS professionals. Examination of Monster.com and HotJobs.com technical skill requirements over a 10-week period revealed a greater demand for contemporary programming languages and Web-development skills and less demand for traditional programming skills.

Personal and Interpersonal/ Management Skills

Emphasis on non-technical IS professionals' interpersonal and management skills has a long history in the IS literature (Cheney and Dickson, 1982; Cappel (2001);Yen (2005);Gupta and Wachter, 1998) LeRouge et al (2005) indicate the need for interpersonal skills as IS professionals interact with end users during project development and training end users. Gupta and Wachter (1998) identify the need for interpersonal and management skills as well as business and technical knowledge for future success in IT. Communication, problem solving skills and creativity are important mixes for the successful technologist. Intrapersonal, or personal skills (skills in knowing and managing oneself) and interpersonal skills (skills in working effectively with others), along with leadership skills, are deemed necessary for success (Covey, 1989). Davis (2003) interviewed graduates employed by small to medium sized companies and found that indeed technical skills were important since many of the jobs involved technical/end user support but their jobs also required strong thinking skills along with the ability to continue to learn. Ehie (2002) found support for strong IT systems knowledge, but in addition to technical skills the IS professional must be able to incorporate interpersonal and business skills as well as writing, speaking, persuading and socialization skills. A study of student perceptions by Medlin et al (2001) supports the "necessary, but not sufficient" requirement of technical skills. In fact, organizational leaders and students recognize

the essential nature of communications skills, analytical skills, and managerial skills.

Fang, Lee, and Koh (2005), recently surveyed IS recruiters from D&B's North American Million Dollar Database considering interpersonal, personal, core IS, and organizational knowledge skills. Interpersonal and personal skills, such as team skills, communication skills, critical thinking skills, personal motivation, and creative thinking skills are ranked as the most important skill sets for entry-level IS employees. These skills are rated much higher than any of the core IS or organizational knowledge skills. Smith and Smarkusky (2005) designed a competency based matrix approach that defined expected performance for successful team knowledge skills relative to the expectations related to level of study of the student.

The Perception Gap

Researchers have also expressed concern about the "gap" between expected levels of skills and observed levels of skills once a person has been hired. Based on discrepancy theory, satisfaction is impacted by the discrepancy between skills that employers' expect and the actual skill level of new hires. Discrepancy theory asserts than an individual's satisfaction is related to the extent to which outcomes match those desired (Locke, 1976). This psychological comparison produces both positive and negative discrepancies. Positive discrepancies are experienced when the perceived attribute (the entry-level employees' performance) is greater than the standard of comparison (the employers' expected level of performance). Negative discrepancies are indicated when entry-level employees perform at a level less than expected. The closer the match, i.e., the smaller the discrepancy between expectations and observations, the greater the satisfaction with the hiring decision and perhaps the likelihood that special future consideration may be given to graduates of particular programs.

Cappel (2001) asked IS managers and professionals to rate the "expected" level of performance for various IS-related job skills versus the "actual" level of skills observed in entry-level IS employees. His research showed that while the business and interpersonal skills are important, the development of programming skills remains an essential component to IS education and that the gaps between "expected" and "actual" performance tended to be greatest for non-technical skills. Weber et al (2001) studied the difference in student and industry skill perceptions and found that initial rating discrepancies were often mediated as students progressed through their program, i.e. student importance ratings were more similar to industry perceptions.

Lerouge et al (2005) considered the existence of gaps within gender and various age groups. This study of systems analysts skills found that some differences in perception did exist among different genders and age groups. Females found interpersonal skills and systems development tasks to be more important than the males, though both genders agree interpersonal skills held the highest preference. Males rated technology skills higher than females. The 50 and above age group rated the use of system development task skills and technology based skills less important than those analysts aged 20-29 or 40-49.

Hingorani and Sankar (1995) acquired student and industry perceptions of twenty skills required of new MIS hires in the Information Systems industry. Results of a comparison of perceptions indicate that the student and the industry rankings differ. Students perceived problem solving as the number one skill of an IS professional, while the industry ranked it at six. Likewise, the industry ranked system analysis and design as the most important skill, while the students ranked it as number six in importance. The broad skill of business communication and interpersonal relations was given a number two ranking by both the students and the industry.

Based on the literature, an examination of personal and interpersonal/management skills seems appropriate. The research will test the following hypotheses:

H1: There is an existing gap between employers' **perceptions of importance** of personal skills for entry-level positions and the **observed level of** expertise of those skills.

H2: There is an existing gap between employers' **perceptions of importance** of interpersonal/management skills for entry-level positions and the **observed level of** expertise of those skills.

3. RESEARCH METHODOLOGY

Using a recently compiled and summarized body of literature (see Appendix A), a requisite skill set was extracted for inclusion in a survey of Midwest employers. Skills extracted from the literature were organized by skill category and distributed to the IS department's advisory board for initial examination and comment.

Entry-level IS skill questions by category were presented in pairs. For the first item in the skill pair, respondents were asked, based on their most recent hiring experience, to respond to each item or statement according to their expected level of expertise for an entry-level position in their organization. A Likert scale was used to capture this information as follows:

- 1 = Skill is not expected of entry-level people in our organization.
- 2 = Limited skill expected in this area
- 3 = Introductory skill base expected
- 4 = Reasonable skill expertise demonstrated
- 5 = Significant skill expertise demonstrated for entry-level employees

For the second item in the skill pair and again based on their most recent hiring experience, respondents were asked to indicate the actual level of expertise observed of the entry-level employee in their organization. The actual skill level was indicated on a Likert scale according to the following criteria:

- 1 = No actual expertise observed
- 2 = Limited expertise observed
- 3 = Introductory expertise observed
- 4 = Reasonable actual expertise observed
- 5 = Significant actual expertise observed

A complete copy of the survey may be found in Appendix B.

Data Collection

A sample of 2500 IS professionals with Midwest (including Iowa, Illinois, Indiana, Kentucky, Missouri, Ohio, and Wisconsin) employment status was obtained from the Project Management Institutes' (PMI) Information Systems and Information Technology Special Interest Groups (ISSIG/ITSIG). The Midwest was chosen since most of our graduates remain in the area (more than 90% in Indiana, Kentucky, and Ohio alone (Tesch et al 2003)). Of the 2500 surveys, 191 were returned and accepted for analysis and 84 were returned as non-deliverable for a response rate of approximately 8%. Respondents represent a cross-section of industries including service, manufacturing, education, retail, consulting, insurance, and financial services. The number of full-time employees in Information Systems departments range from less than 10 to more than 500 employees. Complete demographics are available in Table 1.

Table 1
Demographics

	Count	Frequency
Gender:		
Male	129	68.6%
Female	59	31.4%
Years of professional IS experience:		
< 5 years	5	2.6%
6 to 9 years	27	14.1%
10 to 14 years	38	19.9%
15 or more years	115	60.2%
Position:		
IS Manager	78	41.0%
Project Leader	68	35.8%
IS Professional	16	8.4%
Other	22	11.6%
Industry type:		
Service	46	24.6%
Manufacturing	27	14.4%
Education	4	2.14%
Retail	10	3.2%
Consulting	30	16.0%
Other	71	37.97%
PMP Certification Status:		
Certified	106	55.5%
Pursuing certification	43	22.5%
Intend to pursue certification	16	8.4%
Not Certified	18	9.4%

Variable Measure and Validation

Skill constructs were measured in the areas of personal, as well as interpersonal and management skills. Eight constructs measured personal skills and four constructs measured interpersonal and management

skills. Items used were adapted from previous studies (Braun et al, 2004; Fox et al, 2001; Lee et al, 2002). The same item response stems were used to assess the respondent's perception of importance and observed level of expertise which supports a parallel form that allows for gap assessment. Each item was measured on a Likert scale from one to five as previously described. The items used appear in Table 2.

Table 2
Properties of IS Skill/Knowledge – Convergent Validity and Reliability

Item	Loading	Cronbach Alpha
Interpersonal /Management Skills-Expected (F1)		.81
Leadership	.75	
Teamwork	.73	
Project Management	.73	
Systems Analysis and Design	.63	
Interpersonal /Management Skills - Observed (F2)		.83
Leadership	.78	
Teamwork	.74	
Project Management	.74	
Systems Analysis and Design	.72	
Personal Skills - Expected (F3)		.87
Oral Communication	.70	
Written Communication	.69	
Ability to Listen	.66	
Conceptual Thinking	.71	
Critical Thinking	.76	
Creative Thinking	.70	
Self Motivation	.63	
Ethics	.57	
Personal Skills – Observed (F4)		.88
Oral Communication	.72	
Written Communication	.73	
Ability to Listen	.72	
Conceptual Thinking	.71	
Critical Thinking	.73	
Creative Thinking	.69	
Self Motivation	.67	
Ethics	.56	

Table 2
Properties of IS Skill/Knowledge – Convergent Validity and Reliability – Continued

CFA Fit Indexes:	
1.) Root Mean Square Residual (RMR):	.054
2.) Chi-square/ d.f. ratio: 470.353/230= (p< .001)	2.05
3.) Comparative Fit Index (CFI):	.901
4.) Bollen (IFI) Fit Index	.903
5.) Root Mean Square of Approximation	.078

To examine the reliability and validity of the skills measure, we conducted a confirmatory factor analysis (CFA). The test of the measurement model with the four hypothesized latent variables (personal – expected, personal – observed, interpersonal – expected, interpersonal – observed) produced a good fit. (Chi-square (230) = 470.35, $p < .001$; CFI = .90, IFI = .90, RMSEA = .07. (The Chi-square for the null model was Chi-square (276) = 2,715.61.

As predicted, the factors were positively correlated. The highest correlation, between the interpersonal/management and personal factors was .85. Although correlations among these factors were different from zero, each factor was unique (i.e., discriminate validity) from a strict statistical point of view in that the correlations plus their square standard errors summed to less than 1.00 (Bagozzi et al, 1991). Sixteen non-zero correlations between error terms were estimated in the model: the terms across all pairs of items, expected and observed, as well as the critical and conceptual thinking error terms. Correlation measures are reported in Table 3.

Table 3
Factor Correlations

	F1	**F2**	**F3**	**F4**
Interpersonal – Expected (**F1**)	1.00			
Interpersonal – Observed (**F2**)	*.64*	1.00		
Personal – Expected (**F3**)	*.75*	*.33*	1.00	
Personal – Observed (**F4**)	*.49*	*.85*	*.36*	1.00

Note: All parameter estimates significantly different from zero are italicized

4. RESULTS

The analyses in Table 4 present the gap analysis for interpersonal and personal skills. The perceptions (observed) and expectations are a single measure of the scales from the confirmatory factor analysis. Using the paired-samples t test, there is a significant difference between the interpersonal-expected factor and interpersonal-observed factor ($p < .0001$) indicating support for H1. Similarly, a significant different exists between the personal-expected and personal-observed factors ($p < .0001$) and H2 is supported. Additionally, for each paired sample comparison, the observed factor means were less than the expected factor means (O < E) indicating a negative discrepancy, i.e., the observed performance is less than the standard of comparison (expected performance).

TABLE 4
Gap Analysis for Interpersonal and Personal Skills

	Mean	S.D.	N	T-Stat	Prob. >t
I-E	12.46	3.16	179		
I-O	10.38	3.06	179		
P-E	30.99	4.60	183		
P-O	24.51	5.21	183		
IE-IO	2.08	2.73	179	10.198	.000*
PE-PO	6.49	5.58	183	15.71	.000*

*Statistically significant at alpha < .05
I-E = Interpersonal-Expected
I-O = Interpersonal-Observed
P-E = Personal-Expected
P-O = Personal-Observed
IE-IO = Interpersonal Expected-Interpersonal Observed
PE-PI = Personal Expected-Personal Observed

A comparison of individual variable means and the calculated mean difference is presented in Table 5 in order of greatest mean difference. For interpersonal variable means, the mean differences in order from large to small are teamwork, project management, systems analysis and design, and leadership. Ability to listen, written communication, and self motivation reflect the largest mean differences for personal skill variables.

5. DISCUSSION

This study introduces a framework for examining employers' satisfaction with skills of entry-level employees. Derived from discrepancy theory, the framework concedes that a measurable set of expectations and perceptions exist for entry-level employees' personal and interpersonal skills. We examine differences in the mean satisfaction/performance evaluation for each set of skills expressed by employers.

There is a difference between what practitioners are expecting of new hires and what new hires are delivering. Poor interpersonal skills are associated with failure of newly hired employees. A recent study by Leadership IQ found that new hires fail because they can't accept feedback, they are unable to understand and manage emotions, they lack the motivation to excel, have the wrong temperament for the job, and lastly, lack the necessary technical skills (King, 2005). In terms of interpersonal skills in this study, the largest difference is found in the teamwork variable (.72). Additionally, in setting expectations for interpersonal skills, employers place the largest emphasis (mean of 3.91) on teamwork, indicating the critical nature of this important skill. Members of a team need to be able to accept feedback, keep their emotions in check, and make a meaningful contribution to the team. The implication for curriculum development is to increase the number of opportunities students have to gain experience as part of a team. As educators we need to help our students develop team skills. Smith and Smarkusky (2005) designed a competency based matrix approach for teaching these necessary team skills at the undergraduate level. They defined the expected performance for team knowledge skills relative to the expectations related to the level of study of the student. Variables most closely associated with IS curriculum topics, project management and systems analysis and design skills differ to a lesser degree, .54 and .52 respectively (see Table 5). This is not surprising since IS curriculum changes seek to reflect industry technical requirements.

In the area of personal skills, the largest negative discrepancies are found in the ability to listen (1.06 mean difference), written communication (.98), and self motivation. (.93) These results are consistent with Leadership IQ findings (King, 2005). Employees that cannot accept feedback are perhaps less likely to perform appropriately when it comes to listening. Self motivation results

TABLE 5
Comparison of Variable Level Means

Variable	N	Expected Mean	Expected S.D.	Observed Mean	Observed S.D.	Mean Difference
Interpersonal Skills						
Teamwork	189	3.91	0.86	3.19	0.88	.72
Project Management	187	2.62	1.15	2.08	1.02	.54
Systems Anal. & Design	182	3.18	0.97	2.66	0.93	.52
Leadership	186	2.76	0.98	2.44	0.91	.32
Personal Skills						
Ability to Listen	188	4.13	0.65	3.07	0.90	1.06
Written Communication	189	3.84	0.71	2.86	0.93	.98
Self Motivation	189	4.13	0.78	3.20	0.88	.93
Conceptual Thinking	189	3.64	0.85	2.91	0.87	.73
Critical Thinking	188	3.60	0.82	2.87	0.88	.73
Ethics	185	4.28	0.85	3.56	0.95	.72
Oral Communication	189	3.82	0.70.	3.13	0.82	.69
Creative Thinking	188	3.54	0.90	2.88	0.86	.66

are consistent with Leadership IQ results indicating that new hires lack the necessary motivation to excel.

The top three skills with the largest discrepancy values rank in the top five skills in importance: ability to listen (4.13 – 2nd highest rating), written communication (3.84 – 5th highest rating), and self motivation (4.13 – 2nd highest rating). These results indicate a point of focus for academicians as they seek to narrow the gap.

Results of this study indicate that course development must expand its focus on technical skill development to include opportunities for improving personal and interpersonal skills. Liberal arts universities are well positioned to do just that.

Future Studies

Not without its limitations, future studies should consider the effect of these interpersonal and personal skill discrepancies on career satisfaction, job satisfaction, and project success. Also, an analysis of entry level employee perspectives (post hiring) of these skill requirements could offer valuable insights to both managers, in setting expectations, and academicians in their preparation of future new hires. A larger sample size would significantly improve the ability to generalize results. Finally, the gap expressed in the IS2002 model curriculum guide (Gorgone et al (2002) could be addressed in future studies.

6. REFERENCES

Bagozzi, Richard P., Youjae Yi, and Lynn W. Phillips (1991) "Assessing Construct Validity in Organizational Research," **Administrative Science Quarterly**, 36:3, September, pp. 421-458.

Braun, Gerald F., Debbie Tesch, and Ryan Skeldon (2004) "The Student-Professor Research Relationship: Examining IS Employer Skills Expectations", Proceedings of the Information Systems Educators' Conference Proceedings of ISECON'2004, http://isedj.org/isecon/2004/2245/ISECON.2004.Braun.pdf

Byrd, Terry A. and Douglas E. Turner (2001) "An Exploratory Analysis of the Value of the Skills of IT Personnel: Their Relationship to IS Infrastructure and Competitive Advantage," **Decision Sciences**, 32:1, Winter, pp. 21-55.

Cappel, James J. (2001) "Entry-Level IS Job Skills: A Survey of Employers," **Journal of Computer Information Systems**, 42:2, Winter 2001-02, pp. 76-82.

Cheney, Paul H. and Gary W. Dickson (1982) "Organizational characteristics and information systems: An Exploratory investigation," **Academy of Management Journal**, 25:1, pp. 170-184

Chrysler, Earl and Stuart van Auken (2002) "Entry level value versus career value of MIS courses: Faculty expectations versus alumni perceptions," **Journal of**

Computer Information Systems, 42:3, Spring, pp. 38-43.

Davis, Diane C. (2003) "Job titles, tasks, and experiences of information systems and technologies graduates from a Midwestern university," **Journal of Information Systems Education**,14:1, pp 59-68.

Ehie, Ike C. (2002) "Developing a Management Information Systems (MIS) Curriculum: Perspectives from MIS Practitioners," **Journal of Education for Business**, 77:1, Jan/Feb, pp. 151-158.

Fang, Xiang, Sooun Lee, and Seokha Koh (2005) "Transition of Knowledge/Skills Requirement for Entry-Level IS Professionals: An Exploratory Study Based on Recruiters' Perception," **Journal of Computer Information Systems**, 46:1, Fall pp. 58-70.

Fox, Terry L., Nitham Hindi, and William S. Remington (2001) "Students' Perceptions and Misconceptions of a Career in IS," **Journal of Computer Information Systems**, 42:1, Fall, pp. 83-89.

Gorgone, John T., Gordon B. Davis, Joseph S. Valacich, Heikki Topi, David L. Feinstein, and Herbert E. Longenecker (2002) "IS2002 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems", Association for Information Systems.

Green, Gary I. (1989) "Perceived importance of systems analysts' job skills, roles, and non-salary incentives," **MIS Quarterly**, 13:2, pp. 115-113.

Gupta, J.N.D. and R.M. Wachter (1998) "A capstone course in the Information Systems curriculum," **International Journal of Information Management**, 18:6, pp 427-441.

Hammer, Michael (1990) "Reengineering work: Don't automate, obliterate," **Harvard Business Review,** July/August, pp. 104-112.

Hingorani, K.K. and C. S. Sankar (1995) "Entry Level MIS Jobs: Industry Expectations Versus Academic Preparation", **Journal of Computer Information Systems**, 35:4, Summer, pp. 18-27.

King, Bill (2005) "Poor Interpersonal Skills Doom Many New Hires," **Expansion Management**, 20:11, November, p. 2.

Lee, Sooun, Seokha Koh, David Yen, and Hung-Lian Tang (2002) "Perceptions between IS academics and IS practitioners: an exploratory study," **Information & Management**, 40:1, October, pp. 51-62.

Lee, Denis M.S., Eileen M. Trauth, and Douglas Farwell (1995) "Critical skills and knowledge requirements of IS professionals: a joint academic/industry investigation", **MIS Quarterly**, 19:3, September pp. 313-340.

Lerouge, Cynthia, Sandra Newton, and J. Ellis Blanton (2005) "Exploring the Systems Analyst Skill Set: Perceptions, Preferences, Age, and Gender," **Journal of Computer Information Systems**, 45:3, Spring pp. 12-23.

Liu, Xia, Lai C. Liu, Kai S. Koong, and June Lu (2003) "An Examination of Job Skills Posted on Internet Databases Implications for Information Systems Degree Programs," **Journal of Education for Business**, 78:4, Mar/Apr, pp. 191-196.

Locke, Edwin A. (1976) "The Nature and causes of job satisfaction," In Dunnett, M.D. (Ed.), **Handbook of Industrial and Organization Psychology.** Chicago: Rand-McNally, pp. 1297-1350.

Medlin, B. Dawn, Dinesh S. Dave, and Sandra A. Vannoy (2001) "Students' Views of the Importance of Technical and Non-Technical Skills for Successful IT Professionals," **Journal of Computer Information Systems**, 42:1, Fall, pp. 65-69.

Smith, Harrold H. and Debra L. Smarkusky (2005) "Competency Matrices for Peer Assessment of Individuals in Team Projects", Proceedings of the Information Systems Educators' Conference Proceedings of SIGITE'05, Oct, ACM 1-59593-252-6/05/0010.

Sullivan-Trainor, Michael (1988) "Not just another end-user liaison," **Computerworld**, 22:12, pp. 95-97.

Tesch, Debbie B., Elaine A. Crable, and Gerald F. Braun (2003) "Evaluating IS Curriculum Issues Through an Ongoing Alumni Assessment Mechanism," **Jour-**

nal of Computer Information Systems, 44:2, Winter 2003-04, pp. 40-48.

Trauth, Eileen M., Douglas W. Farwell, and Denis Lee (1993) "The IS expectation gap: Industry expectations versus academic preparation," **MIS Quarterly**, 17:3, pp. 293-307.

Weber, James E., Vicky J. McIntyre, and Mark Schmidt (2001) "Explaining IS Student and IS Industry Differences in Perceptions of Skill Importance," **Journal of Computer Information Systems**, 41:4, Summer, pp. 79-83.

Yen, David C., Kuanchin Chen, Seokha Koh, and Sooun Lee (2005) "An east-west comparison of IS professionals' performance and knowledge/skills: An empirical study of USA vs. Taiwan," **Communications of AIS**, 15, pp. 162-182.

Appendix A
Literature Review of Employer IS Skill Requirements

1. Byrd, T.A. and Turner, D.E. "An Exploratory Analysis of the Value of the Skills of IT Personnel: Their Relationship to IS…", *Decision Sciences*, 32(1), Winter 2001, pp. 21-55.
2. Cappel, J.J. "Entry-Level IS Job Skills: A Survey of Employers", *Journal of Computer Information Systems*, 42(2), Winter 2001-2002, pp. 76-82.
3. Doke, E. R. and Williams, S.R., "Knowledge and Skill Requirements for Information Systems Professionals: An Exploratory Study", *Journal of Information Systems Education*, Spring 1999, pp. 10-18
4. Ehie, Ike C., "Developing a Management Information Systems (MIS) Curriculum: Perspectives from MIS Practitioners", *Journal of Education for Business*, 77(1), Jan/Feb 2002, pp. 151-158.
5. Fougere, K.T., Macdonald, L.E., Sousa, K.J., "COBOL's Role in a College Curriculum – A Pilot Study", *Journal of Education for Business*, 78(3), Jan/Feb 2003, pp. 164-169.
6. Fox, T.L., Hindi, N., and Remington, W.S. "Students' Perceptions and Misconceptions of a Career in IS," *Journal of Computer Information Systems*, 42(1), Fall2001, pp. 83-39.
7. Hayes, M. "Hot Job Skills for the Year Ahead", *Informationweek*, Jan 7 2002, http://www.informationweek.com/story/showArticle.jhtml?articleID=6508904
8. Hingorani, K.K. and Sankar, C.S., "Entry Level MIS Jobs: Industry Expectations Versus Academic Preparation", *Journal of Computer Information Systems*, Summer 1995, 35(4), pp. 18-27.
9. Lee, Denis M.A., Trauth, Eileen M., & Farwell, Douglas, (1995). "Critical skills and knowledge requirements of IS professionals: a joint academic/industry investigation", *MIS Quarterly*, 19(3), September, 313-340.
10. Lee, S., Koh, S., Yen, D., Tang, H., "Perceptions between IS academics and IS practitioners: an exploratory study", *Information & Management*, 40(1), October 2002, pp. 51-62.
11. Lightfoot, J.M., "Fads Versus Fundamentals: The Dilemma for Information Systems Curriculum Design", *Journal of Education for Business*, 75(1), Sept/Oct 1999, pp. 43-50.
12. Lidtke, D.K. and Stokes, G. "An information systems-centric curriculum, ISCC '99", *Journal of Systems & Software*, 12/30/99, 49(2/3), pp. 171-175.
13. Liu, X., Kiu, L.C., Koong, K.S., Lu, J., "An Examination of Job Skills Posted on Internet Databases Implications for Information Systems Degree Programs", *Journal of Education for Business*, 78(4), Mar/Apr 2003, 191-196.
14. Medlin, B.D., Dave, D.S., Vannoy, S.A. "Students' Views of the Importance of Technical and Non-Technical Skills for Successful IT Professionals", *Journal of Computer Information Systems*, 42(1), Fall2001, pp. 65-69.
15. Mykytyn Jr., Peter P., Mykytyn, Kathleen, & Raja, M.K., (1994). "Knowledge acquisition skills and traits: a self-assessment of knowledge engineers", *Information & Management*, 26, 95-104.
16. Nelson, R.R., "Educational Needs as Perceived by IS and End-User Personnel: A Survey of knowledge and Skill Requirements", *MIS Quarterly*, December 1991, vol 15, no 4, pp. 503-525.
17. Tang, H., Lee, S., Koh, S. "Educations Gaps as Perceived by IS Educators: A Survey of Knowledge and Skill Requirements", *Journal of Computer Information Systems*, Winter 2000/2001, 41(2), pp. 76-84.
18. Trauth, E.M., Farwell, D.W., Lee, D. "The IS Expectation Gap: Industry Expectations Versus Academic Preparation", *MIS Quarterly*, September 1993, pp. 293-307.
19. Weber, J.E., McIntyre, V.J., and Schmidt, M. "Explaining IS Student and IS Industry Differences in Perceptions of Skill Importance,", *Journal of Computer Information Systems*, 41(4), Summer 2001, pp. 79-83.
20. Yen, D.C., Lee, S., & Koh, S. "Critical knowledge/skill sets required by industries: an empirical analysis,", *Industrial Management & Data Systems*, 101(8/9), 2001, pp. 432-442.
21. "Part 1: IS/IT professionals: work, practice and skills", *Journal of Management Development*, 19(2), 2000, pp. 100-109.

Appendix B

CONFIDENTIAL SURVEY OF MIDWEST IS EMPLOYERS
DEPARTMENT OF MANAGEMENT INFORMATION SYSTEMS

Section I: Entry-level IS skills are presented in this section in pairs. For the first item in the skill pair based on your most recent hiring experience, please respond to each item or statement according to your **expected level of expertise** for an entry-level position in your organization. For each item, specify your expected skill level according to the following criteria:

- 1 = Skill is not expected of entry-level people in our organization.
- 2 = Limited skill expected in this area
- 3 = Introductory skill base expected
- 4 = Reasonable skill expertise demonstrated
- 5 = Significant skill expertise demonstrated for entry-level employees

For the second item in the skill pair and again based on your most recent hiring experience, please respond to each item or statement according to the actual level of expertise observed of the entry-level employee in your organization. For each item, specify the actual skill level according to the following criteria:

- 1 = No actual expertise observed
- 2 = Limited expertise observed
- 3 = Introductory expertise observed
- 4 = Reasonable actual expertise observed
- 5 = Significant actual expertise observed

		Expected Level of Expertise					**Observed Level of Expertise**					*Does not apply, not available, not required*
		No expertise expected				*Significant expertise expected*	*No expertise observed*				*Significant expertise observed*	
	Personal Skills											
1	Oral Communication	1	2	3	4	5	1	2	3	4	5	( )
2	Written Communication	1	2	3	4	5	1	2	3	4	5	( )
3	Ability to Listen	1	2	3	4	5	1	2	3	4	5	( )
4	Conceptual Thinking	1	2	3	4	5	1	2	3	4	5	( )
5	Critical Thinking	1	2	3	4	5	1	2	3	4	5	( )
6	Creative Thinking	1	2	3	4	5	1	2	3	4	5	( )
7	Self Motivation	1	2	3	4	5	1	2	3	4	5	( )
8	Ethics	1	2	3	4	5	1	2	3	4	5	( )
9	Other Personal Skills: Please Specify											
	Interpersonal and Management Skills											
10	Leadership	1	2	3	4	5	1	2	3	4	5	( )
11	Teamwork	1	2	3	4	5	1	2	3	4	5	( )
		Expected Level of Expertise					**Observed Level of Expertise**					

		No expertise expected				*Significant expertise expected*	*No expertise observed*				*Significant expertise observed*	*Does not apply, not available, not required*
12	Project Management	1	2	3	4	5	1	2	3	4	5	( )
13	Systems Analysis and Design	1	2	3	4	5	1	2	3	4	5	( )
14	Other Interpersonal and Management Skills: Please specify											
	Technical Skills											
15	Object-oriented Programming (OOP) Technique	1	2	3	4	5	1	2	3	4	5	( )
16	Structured Programming Techniques	1	2	3	4	5	1	2	3	4	5	( )
17	OOP Language such as Java or C++	1	2	3	4	5	1	2	3	4	5	( )
18	Visual Basic or other Visually-based Programming Tools	1	2	3	4	5	1	2	3	4	5	( )
19	Web Site Development using HTML or a tool such as FrontPage or Dreamweaver	1	2	3	4	5	1	2	3	4	5	( )
20	Web Application Development with XML	1	2	3	4	5	1	2	3	4	5	( )
21	Scripting Tools such as JavaScript, PERL, or ASP	1	2	3	4	5	1	2	3	4	5	( )
22	Client-server based Database Tools such as Oracle or SQL Server	1	2	3	4	5	1	2	3	4	5	( )
23	Unix or Linux Operating System	1	2	3	4	5	1	2	3	4	5	( )
24	Mini or Mainframe Operating System	1	2	3	4	5	1	2	3	4	5	( )
25	ERP Tools such as SAP, Oracle, or PeopleSoft	1	2	3	4	5	1	2	3	4	5	( )
26	Telecommunications and Networking	1	2	3	4	5	1	2	3	4	5	( )
27	Network Security	1	2	3	4	5	1	2	3	4	5	( )
28	Data Warehousing	1	2	3	4	5	1	2	3	4	5	( )
29	Knowledge Management	1	2	3	4	5	1	2	3	4	5	( )
30	Systems Development Life Cycle	1	2	3	4	5	1	2	3	4	5	( )
31	Case Study Experience	1	2	3	4	5	1	2	3	4	5	( )
32	Co-Op Experience	1	2	3	4	5	1	2	3	4	5	( )
33	Other Technical Skills: Please specify											

		Expected Level of Expertise					Observed Level of Expertise					Does not apply, not available, not required
		No expertise expected				*Significant expertise expected*	*No expertise observed*				*Significant expertise observed*	
	General Business Knowledge											
34	Accounting	1	2	3	4	5	1	2	3	4	5	( )
35	Finance/Economics	1	2	3	4	5	1	2	3	4	5	( )
36	Operations Management	1	2	3	4	5	1	2	3	4	5	( )
37	Supply Chain Management	1	2	3	4	5	1	2	3	4	5	( )
38	Marketing	1	2	3	4	5	1	2	3	4	5	( )
39	International Relations	1	2	3	4	5	1	2	3	4	5	( )
40	Business Statistics	1	2	3	4	5	1	2	3	4	5	( )
41	Other Business Skills: Please Specify											

Section II. Please provide the following information about yourself and your organization.

1. Your gender: __ Male __ Female
2. Your employer's state:

__ Iowa __ Illinois ___ Indiana __ Kentucky __Missouri __ Ohio __ Wisconsin

__ Other, Please Specify: _____

3. Which best describes your position:

__ IS Manager __ Project Leader ___ IS Professional

__Other, Please Specify: _____

4. The industry type of your company:

__Service __ Manufacturing __ Education __ Retail __ Consulting

__ Other, Please Specify: _____

5. Years of professional IS experience:

__ < 5 years __ 6 to 9 years __ 10 to 14 years __ 15 or more years

6. Number of full-time employees in your Information System Department:

__ <= 10 __ 11-50 __ 51-100 __ 101-500 __ >500

7.The average size of IS project teams in your organization:

__ <= 7 members __ 8-15 members ___16-25 members __ 26 or more

8. The average IS project duration in your organization:

__ < 1 year __ 1-2 years __ 2-3 years __ 3-5 years __ 6 or more

9. Your PMP certification status:

__ Certified __ Pursing certification __ Intend to pursue certification __Not Certified