

NORTHERN ILLINOIS UNIVERSITY

Are Curricula that Combine Operations Management and Information Systems

Adequately Preparing their Students for the Workforce?

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Abstract

The purpose of this study is to assess the perceptions of recent alumni on how well a curriculum that combines operations management and information systems prepared them for the workforce. To address our research question, a web-based survey was developed. Our findings seem to indicate that the more recent graduates in our department felt the most adequately prepared for both general business and technical skills. This may mean that our department is continually improving their curriculum over time. Overall, students felt at least moderately prepared for most of the specific skills we studied. Our methodology can be broadly applied to any department that combines operations management and information systems that is concerned with curriculum assessment.

Introduction

Over the years, research has revealed a significant difference between the reported desires of IS employers, and the actual job search experiences of the IS graduates themselves. In a study done by Reitch and Nelson (1990), IS managers were found to be likely to hire the IS graduate with a business-degree than a computer science major who was more technically trained. IS managers indicated that while not as technically oriented as a computer science major, IS graduates have a better comprehension of the business environment. Such understanding is necessary for long-term success in their firms.

Kane's (1993) study reported that Fortune 500 recruiters assumed that graduates possess the appropriate technical skills already, so they should pinpoint their focus on the candidate's people skills. Practitioners are looking for college graduates with general business skills, especially people skills and problem-solving skills. Other studies have shown that technical skills are important but do not outweigh having a good understanding of the business while commanding effective teamwork, interpersonal, communication, and organizational skills (Nelson, 1988; Mistic, 1996; Gabric and McFadden, 2001; Albin and Otto, 1987; Turner and Lowry, 1990).

However, IS graduates with a more technical background tend to be in greater demand for entry-level positions than those without the technical expertise (Towell, 1997). While general business skills are important for collegiate education, there is a disparity between what is provided and what employers are looking for (Litecky and Arnett, 1992). When examining the employers' perspective, Lightfoot (1999) found that priority is normally given to the new hires that can offer immediate productivity to the organization (Turner and Lowry, 1990), whereas students with the potential to develop these skills in the future are overlooked. Businesses are

looking for new employees that can provide the expertise of the latest applications and tools. Businesses want colleges to provide a finished, immediately usable product that is ready to face real world problems. Businesses are looking to reduce costs by hiring graduates that will not require long periods of training to become proficient in a new technical environment (Lightfoot, 1999).

Because of the aforementioned reasons, students involved with programs that have not adequately prepared them with technical skills may find themselves at a loss in the entry-level job market (Todd and McKeen, 1995). Research from Reitsch and Nelson (1990) reaffirmed that recent IS graduates have lacked the confidence to successfully compete in the entry-level job market because their IS background lacked the technical skills needed to obtain that first job. Graduates felt that their job prospects would have been strengthened with additional technical training. Although a broader business education is considered to be a beneficial tool in the long run, business orientation does not help in finding the first job.

Students tend to believe that in order to obtain that entry-level job, curriculums must focus on the most current technical needs of the business world (Lightfoot, 1999). The only benefit in teaching the current fad applications is that students have a better chance of getting their first job. However, there are no guarantees that the student will have the fundamental business skills to be able to learn new things and grow beyond his or her initial job. As a result, curricular designers keep running into the problem of reaching the right balance between technical and business knowledge (Rogow, 1993).

The balance between technical and general business skills usually depends on how the IS curriculum is packaged. The IS curriculum is usually packaged in two separate ways. There is an "unmixed" IS major in which only IS type courses are included, and a "mixed" major where

the IS major is combined with some other area of study. In most instances the IS function is housed within another department (Stolen, 1993). The Department of Operations Management and Information Systems (OMIS) at Northern Illinois University (NIU), offers a Bachelor of Science degree that combines OM and IS. This curriculum strives to blend the quantitative, business operations, and decision-making techniques learned in an OM curriculum with application of technology for solving business problems (Gabric and McFadden, 2001). One goal of the OMIS department at NIU is to close the gap between the skills that employers desire and the capabilities of graduating students.

A central debate within the department has always been whether it is more beneficial to offer technical skills over business skills, or vice versa. One way to test if our department is achieving the correct balance is to see if the department is adequately preparing their students for the workforce. The purpose of this study is to assess the perceptions of recent OMIS alumni on how well a curriculum that combined OM and IS prepared them for the workforce. We will explore what skills the alumni feel they were well prepared for in the OMIS program, and examine important general business and technical skills that recent OMIS graduates utilize in their everyday jobs. We investigate both general business skills and technical skills that would be beneficial for a position. General business skills are generic, more broad-based skills that would be desirable for any business-level position. Examples of general business skills are effective written and oral communication skills, strong team-building skills, and leadership abilities. Technical skills tend to deal with more current technologies and applications that our curriculum embraces. Technical skills included programming languages, web design skills, operating systems, and database skills. We assess the importance and preparedness of all these skills.

This study can serve as an assessment of our undergraduate operations management and information systems curriculum. The results can be broadly applicable to any department that combines OM and IS. It may be useful in guiding curriculum decisions, involving such decisions as what courses to require or what programming languages to teach (Nelson, 1988). In addition, individual professors can use the results to help them in designing or redesigning individual courses.

Research Hypothesis

The factors of interest in this study include 1) graduation year, 2) gender, 3) major emphasis (OM or IS), 4) the importance of general business skills to their job, and 5) the importance of technical skills to their job. Specifically, the following research hypotheses are addressed in this study:

H1: Graduation year, gender, major emphasis, the importance of general business skills, and the importance of technical skills are useful in estimating how well the alumni felt that the OMIS program prepared them with general business skills.

H2: Graduation year, gender, major emphasis, the importance of general business skills, and the importance of technical skills to their job are useful in estimating how well the alumni felt that the OMIS program prepared them with technical skills.

Methodology

While looking for valuable sources of information, many colleges have gathered feedback from alumni to improve the quality of their curriculum and of the students they produce. Alumni feedback is a good indicator of employer needs and can provide insight into whether a curriculum is headed in the right direction. Comments from experienced alumni

provide helpful information on long-range strategic issues and trends such as skills needed by newly hired employees (Schmidt, 1991).

In this study, we survey alumni that have graduated from the OMIS program at NIU. In an attempt to improve the survey response rate, a web-based survey was developed. A pilot test was administered to a small group of alumni for the purpose of reducing ambiguity, inconsistencies, and improving the layout of the questions.

The first section of the survey asked respondents for demographic variables such as gender, graduation date, and job characteristics. The second section focused on the importance of general business and technical skills to their current job. The alumni respondents were instructed to indicate the importance of the skill to their job on a 5-point Likert scale, where 5 = high importance, 3 = medium importance, and 1 = low importance. The third part of the survey asked how well the OMIS department prepared them for these general business and technical skills. The level of preparation was also indicated by a 5-point Likert scale, where 5 = high preparation, 3 = medium preparation, and 1 = low preparation. The individual items for the general business skills were based on research conducted by Gabric and McFadden (2001). The technical skills were divided into four parts: 1) programming languages, 2) web design skills, 3) operating systems, and 4) database skills.

We surveyed 203 OMIS alumni that were obtained from our departments' alumni database. For the first round, an email was sent asking alumni to fill out the web-based survey. A total of 74 emails were returned as undeliverable. Out of the remaining 129 valid emails, 81 surveys were completed, yielding a response rate of 63%.

To increase the sample size, a second wave of correspondence was administered. A total of 122 letters were sent via U.S. mail to those who either did not respond to the email or whose

email address was invalid. Thirteen letters were returned as undeliverable. Out of the 203 total surveys originally sent, 5 people could not be contacted either by mail or email. However, 32 additional responses were obtained through the second round. The revised response rate was 57.1% (113/198).

As can be seen from Table 1, the majority of the respondents was male and had an area of emphasis in information systems. The graduation dates ranged from 1988-2001, but 83% of the respondents graduated within the last 4 years (1998-2001).

Table 1
Demographics of Alumni Respondents

By Gender	Percent
Male	58.41
Female	41.59
By Area of Emphasis	
Information Systems	69.91
Operations Management	30.09
By Graduation Year	
2001	17.70
2000	26.55
1999	20.35
1998	18.58
1997	5.31
1996	3.54
1995	0.00
1994	2.65
1993	1.77
1992	0.00
1991	0.00
1990	0.88
1989	1.77
1988	0.88

We assessed the internal consistency of the sets of questions within each factor using Cronbach's alpha (Cronbach, 1951; Hosmane, Maurath, and Manski, 2000). As seen in Table 2, the values of Cronbach's alpha ranged from 0.861 to .924, indicating strong internal consistency among items within each factor. These findings validate the use of the various sets of questions to represent each factor of the study.

Table 2
Cronbach's Alpha of Multi-Item Correlation

	Importance Ranking	Preparedness Ranking
General Business Skills	0.861	0.900
Technical Skills	0.913	0.924

Table 3 provides the mean scores for the perceived importance and preparedness of general business and technical skills.

Table 3
Importance versus Preparedness Mean Scores
For General Business and Technical Skills

	Importance Ranking	Preparedness Ranking
General Business Skills	4.302	3.718
Technical Skills	2.466	1.927

Research hypotheses 1 and 2 were interested in determining what factors might be useful in predicting the OMIS graduates overall preparedness of their general business skills

(hypothesis 1) and technical skills (hypothesis 2). The independent variables of interest in this study included graduation year, gender, major emphasis, the importance of general business skills to their job, and the importance of technical skills to their job. To address these issues, multiple regression was used.

In addition to hypothesis testing, we ranked the general business and technical skills in order of importance to the respondents' jobs and compared them to the rankings of how well alumni felt the OMIS program prepared them for those skills.

Results

Hypothesis 1: Overall preparedness of General Business Skills

Research hypothesis 1 was concerned with ascertaining factors that may be useful in predicting an alumni's preparedness of general business skills. The results using multiple regression, are found in Table 4. The only factors significantly associated with general business skills included the graduation year, gender, and the perceived importance of general business skills to their job. These findings seem to indicate that as the graduation year becomes more recent, the OMIS graduates felt more adequately prepared with general business skills. This may mean that the OMIS department is doing a great job of continuously improving their program to develop general business skills. In addition, the results seem to show that males tend to be better prepared with general business skills. Furthermore, alumni with jobs that place an increase in importance in these skills tend to be adequately prepared with general business skills.

Table 4
Multiple Regression Analysis of Preparedness of Business and Technical Abilities

Dependent Variable:	Preparedness of General Business Skills		Preparedness of Technical Skills	
Independent Variables	p-values		p-values	
Graduation Year	0.0131	**	0.0014	**
Gender	0.0217	**	0.2507	
Major Emphasis	0.1307		0.0741	*
Importance of Business Skills	0.0001	**	0.7007	
Importance of Technical Skills	0.6958		0.0024	**
* p < 0.10				
** p < 0.05				

Hypothesis 2: Overall preparedness of technical skills

Hypothesis 2 is very similar to research hypothesis 1, however, the dependent variable of interest is the preparedness of the alumni's technical skills. These findings also seem to indicate that the more recent graduates tend to feel more adequately prepared with technical skills. This may suggest that the OMIS department is doing a better job each year in improving student's technical skills. Furthermore, alumni with jobs that place an increase in importance in these skills tend to be adequately prepared with technical skills.

Rankings

Table 5 provides the relative rankings, and mean scores of alumni perceptions of general business skills: how important they were to their job and how well they felt the OMIS department prepared them for each skill. The alumni reported that their top 3 most important general business job skills were (1) problem-solving skills, (2) verbal communication skills, and

(3) listening skills. These top three general business skills are consistent with the top 3 general skills ranked by employers in Gabric and McFadden's study (2001). Given that a mean score of 3 = medium importance, all skills were viewed by the respondents to be at least of moderate importance. Alumni perceived that the OMIS program prepared them best in (1) verbal communication skills, (2) team-building skills, and (3) problem-solving skills. Note that problem solving and verbal communication skills were rated as the two most important general business skills. Although team building was listed as 9th in importance, it is still viewed as important (mean = 4.35) to their job.

Another interesting finding was that listening skills was one of the top 3 general business skills important to their jobs, whereas alumni ranked preparedness of listening skills very low at #11. However, they still believed they were at least moderately prepared (mean = 3.63) in this area.

Table 5
General Business Skills: Comparison of Importance to Job VS. Curriculum Preparedness

Business Skills	Importance Ranking	(Mean Score, Std. Dev.)	Preparedness Ranking	(Mean Score, Std. Dev.)
Problem-Solving Skills	1	(4.78, 0.48)	3	(3.99, 0.77)
Verbal Communication Skills	2	(4.70, 0.50)	1	(4.68, 0.52)
Listening Skills	3	(4.60, 0.63)	11	(3.63, 0.80)
Time Management Skills	4	(4.53, 0.70)	6	(3.77, 0.95)
Organizational Skills	5	(4.46, 0.63)	5	(3.78, 0.90)
Written Communication Skills	6	(4.38, 0.78)	4	(3.81, 0.83)
Leadership Skills	7	(4.37, 0.76)	12	(3.61, 0.87)
Handling Ambiguous Situations	8	(4.36, 0.68)	14	(3.24, 0.85)
Team-Building Skills	9	(4.35, 0.78)	2	(4.35, 0.78)
Cross-Functional Perspective	10	(4.32, 0.77)	10	(3.70, 0.96)
Managing Projects	11	(4.29, 0.79)	9	(3.73, 0.97)
Working Independently	12	(4.25, 0.87)	6	(3.77, 0.80)
Negotiation/Conflict Resolution	13	(3.98, 0.86)	16	(3.15, 0.89)
Follows Structured Format	14	(3.91, 0.95)	8	(3.74, 0.87)
Appreciating Diversity	15	(3.88, 0.97)	13	(3.34, 0.97)
Global Awareness	16	(3.66, 0.99)	15	(3.19, 0.99)

Table 6 provides a ranking of technical skills both in terms of importance and preparedness. Given that a mean score of 1 and 2 equals low importance, most technical skills were viewed by the respondents to be at a low importance ranking, with the exception of Windows NT, Windows, SQL, and Microsoft Access. Given that a mean score of 1 and 2 equals low preparation, most technical skills were viewed by the respondents to be at a low preparation ranking, with the exception of Windows, and Microsoft Access.

The alumni reported that their top two most important programming language skills were (1) Visual Basic, and (2) Java. However, an interesting finding was that even though Java programming skills were one of the top two programming skills important to their jobs, alumni

ranked preparedness of Java programming skills as the least. Note however, that all of these programming languages were rated as less than medium importance.

All web design skills, except for HTML, were viewed by the respondents to be at a low preparation ranking. However, the mean importance ratings for these skills were also fairly low. Interestingly, the OMIS program at NIU did not include a web design course until the Fall 2000 semester.

Given that a mean score of 3 = medium importance, the Windows NT operating system was ranked by the respondents as a medium to medium-high importance (mean = 3.76). Given that a mean score of 2 = medium-low preparation, the OMIS program prepares their students with medium-low level of understanding of Windows NT. However, for Windows, the mean score for importance and preparedness were more similar.

SQL database skills were ranked by the respondents as a medium to medium-high importance (mean = 3.59). Given that a mean score of 2 = medium-low preparation, the OMIS program prepares their students with medium-low level of understanding of SQL. However, the mean preparedness for Microsoft Access was ever slightly higher than its importance score.

Table 6
Technical Skills: Comparison of Importance to Job VS. Curriculum Preparedness

Technical Skills	Importance Ranking	(Mean Score, Std. Dev.)	Preparedness Ranking	(Mean Score, Std. Dev.)
Programming Languages				
Visual Basic	1	(2.58, 1.47)	3	(2.19, 1.25)
Java	2	(2.57, 1.51)	6	(1.24, 0.62)
C/C++	3	(2.25, 1.36)	2	(2.43, 1.22)
UNIX Shell Script	4	(2.12, 1.38)	4	(1.44, 0.80)
Cobol	5	(1.78, 1.31)	1	(2.62, 1.36)
Perl	5	(1.78, 1.14)	5	(1.25, 0.62)
Web Design Skills				
HTML	1	(2.75, 1.51)	1	(2.77, 1.32)
JavaScript	2	(2.64, 1.52)	3	(1.44, 0.86)
XML	3	(2.50, 1.55)	5	(1.32, 0.72)
ASP	4	(2.30, 1.47)	4	(1.38, 0.84)
VBScript	5	(2.28, 1.35)	2	(1.50, 0.89)
CGI/Script	6	(1.83, 1.08)	6	(1.26, 0.59)
Operating Systems				
Windows NT	1	(3.76, 1.43)	2	(2.44, 1.47)
Windows	2	(3.27, 1.52)	1	(3.08, 1.44)
MS-DOS	3	(2.52, 1.38)	3	(2.09, 1.16)
JCL	4	(1.84, 1.22)	4	(1.48, 0.84)
OS/2	5	(1.64, 1.10)	5	(1.19, 0.53)
Database Skills				
SQL	1	(3.59, 1.58)	2	(2.74, 1.30)
Microsoft Access	2	(3.21, 1.34)	1	(3.46, 1.29)
Oracle	3	(2.69, 1.66)	3	(1.92, 1.11)
DB2	4	(2.38, 1.62)	4	(1.73, 1.22)
Sybase	5	(1.65, 1.10)	5	(1.27, 0.63)

Conclusion

The results of this study seem to indicate that the OMIS program at NIU is adequately preparing their students for the workforce. One interesting finding was that the preparedness for both general business and technical skills was linked to graduation year. In other words, as the graduation year increased, alumni's preparedness ratings also increased. One interpretation of

these findings is that our department is continuously improving in preparing students for these important marketable skills.

Results also indicate that alumni felt they have been at least moderately prepared for most general business skills. General business skills are needed for future advancement within a company. The temptation of some educators may be to overemphasize the currently popular technical tools and programming languages at the expense of learning the more general business skills needed to succeed later on in their careers. The only benefit in teaching the currently popular applications may be that students have a better change of getting their initial job.

Another interesting finding was that the preparedness of listening skills was ranked substantially lower than other general business skills. Alumni ranked listening skills as 11 out of 16. This was quite surprising when alumni perceived listening skills to be the third most important general business skill to their job. This may suggest that students may not realize how important listening skills will be to their jobs, or that educators need to better emphasize this skill. In addition, alumni ranked the importance of team building skills lower than their preparedness. Alumni ranked team-building skills as 9 out of 16 in importance. However, it is still viewed as important (mean = 4.35) to their job.

Another interesting finding within the technical skills area was that more organizations seem to be moving towards a more object oriented development as opposed to a structured programming approach. Alumni reported that Visual Basic, Java, and "C" were the most important programming languages to their jobs. Even though Java programming skills were one of the top two programming skills important to their jobs, alumni ranked preparedness of Java programming skills as the least. The OMIS program needs to consider adding a Java programming course to their curriculum in order to provide students with a technical skill that

seems to be a very important skill in the workforce today. New graduates should be well versed in Object Oriented concepts regardless of the type of business that they choose (Zahmen, 1999).

SQL database skills were given a medium to medium-high importance (mean = 3.59) rating. According to those surveyed, the OMIS program prepared them with a medium to low level of understanding of SQL. SQL database skills are another important skill that the OMIS program should consider offering. Windows NT is yet another area for improved emphasis as it also received a medium to low level of preparation by the OMIS alumni surveyed.

Future research might focus on how well the OMIS program prepared students for obtaining their critical jobs. Research might also compare the computer science curriculum to the IS curriculum concerning the differences in preparedness of general business and technical skills. Furthermore, other research can use our methods to assess if the way they package their IS major is adequately preparing their students for the workforce. It is possible that our sample may not represent the view of all OM and IS alumni. Nevertheless, our method could be broadly applicable to other departments that combine OM and IS. The information presented in this paper may be useful to academic administrators in determining possible areas for curriculum enhancements.

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