SPECIALTY COURSE OFFERINGS IN IS EDUCATION: IS THERE A FAST "TRACK" FOR JOB PLACEMENT SUCCESS?

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ABSTRACT
This paper reports on a study of undergraduate MIS students that explored the relationship between IS course specialization and initial full time job placement and starting salary. Student academic records and career placement survey data were analyzed for 369 MIS students who graduated during the period of 1998-2003. The findings from this study indicate that course specialization is associated with differences in starting salary: graduates who specialized in a “system development” track had significantly higher starting salaries than those who specialized in a “IS infrastructure” track. Course specialization was not related to job placement rate. Also, the number of IS-related courses completed was not related to starting salary or job placement.

Keywords: IS curriculum, IS careers, IS job placement, AACSB, IS 2002

INTRODUCTION
Undergraduate university degree programs in information systems (IS) are constantly evolving as educators and other stakeholders respond to the changes in the field and gain a better understanding of the complexities and nuances of the discipline. For example, the “IS 2002” curriculum model is the latest of a series of curricula proposed by professional organizations to guide universities as they refine their curricula. As IS educators make decisions about curricula, they often need to address curriculum design issues that can be at odds with one another. For example, the desire to implement a general model curriculum that requires a large number of courses (e.g., IS 2002) may be counterbalanced by constraints on the number of credits in a university program that may be allocated to IS classes. Also, for some institutions there can be a tension between the diverse knowledge requirements of a more general curriculum model vs. the demands for more specialized IS knowledge by regional employers who recruit graduates.

When considering the tradeoffs associated with these types of curriculum design decisions, there are multiple perspectives that may be considered with respect to the benefits to the student. For instance, should an IS curriculum emphasize diversity of knowledge, so as to build a broad foundation for a graduate’s future career? Or, should a curriculum offer the opportunity for a student to specialize in an area of interest or an area most marketable in the workplace? The former perspective would argue for a diverse curriculum, while the second perspective would make the case for a curriculum with more specialization. The purpose of this paper is to report on a study that considers the issue of IS curriculum from the perspective of career placement. Student academic records and career placement survey data have been analyzed to explore the relationship of IS course specialization to job placement and starting salary.

IS Curriculum Models
The literature of the information systems field contains many articles concerning the curriculum. Typically, these articles are based on surveys or panels of educators (3,5), alumni (1,9), industry representatives (2), or multiple stakeholders (4,10). One innovative approach sampled the skills listed in on-line job postings (7). Researchers have also provided articles synthesizing multiple perspectives (6). Many of these articles contain prescriptions for the IS curriculum.
One of the most well known curriculum models is IS 2002, which proposes a diverse set of eleven courses, including a “prerequisite” personal productivity software tools course. The IS 2002 model can provide an IS graduate with an outstanding knowledge base. For some IS programs, however, it is difficult to fit all of the courses prescribed by IS 2002 into the curriculum. In particular, it can be difficult for schools where the IS program is part of a business curriculum and the IS curriculum must share credit hours with other business courses and general education requirements. For example, at Western Washington University (WWU) the university curriculum committee has established that one-third of the student’s program of study should be devoted to general education. None of the MIS curriculum at WWU can be used to satisfy general education requirements.

The MIS program at WWU is part of an AACSB-accredited college of business. AACSB Standard 15 contains a list of several topical areas such as Accounting, Finance, Management, and others. In a typical business curriculum these areas are covered in approximately sixteen courses. At WWU, only one of the MIS courses is part of the “core” business curriculum. Once the AACSB business core and general university education requirements are satisfied, the remaining space in the curriculum for a student with a MIS concentration is five required courses and two “constrained elective” MIS courses (i.e., electives chosen from an approved list). This appears to be typical; Gill (3) found that the median IS program required eight courses.

Students may take additional IS courses: they have approximately seven “free elective” courses once requirements are completed. Some WWU students take additional MIS courses or computer science (CS) courses to meet the credit requirements for “free electives,” while others choose non-technical coursework (e.g., liberal arts).

The WWU MIS faculty has developed a program that includes essential topics such as principles of MIS, analysis and design, programming, database management, and IS management. For their “constrained electives,” students choose from several classes including hardware and operating systems, telecommunications, networking, advanced database, advanced programming, decision support systems, and web development. Although there is no formal designation, most students and faculty recognize distinct technical “tracks” of courses (e.g., systems development, networking) – reinforced by the structure of prerequisites.

In the design of the curriculum, the MIS faculty are not able to require all the courses of IS 2002 or its predecessor, IS ‘97. The faculty has closely examined the IS 2002 curriculum and considered making modifications. The electives would be eliminated and replaced by a curriculum that would teach each of the subjects in IS 2002. However, the faculty has wondered whether this type of general curriculum would best serve the needs of WWU graduates.

**Rationale for Curricular Specialization**

There has been some discussion on the value of a more specialized type of curriculum. Almost ten years ago, Lee and his colleagues (4, p. 314) argued that “the concept of a generic curriculum to meet the needs of all future MIS professionals is obsolete, and different IS curricula should be tailored to meet the needs of different IS careers.” Lightfoot (6, p. 48) echoes those arguments, suggesting that IS programs should be “tailored to the specific needs of students, allowing them to select courses that emphasize the learning units most important to their chosen career path.” Ehie (2) surveyed practitioners and notes that they suggest niche areas such as e-commerce, internet application development, database administration, business systems analysis, network administration, and systems programming.
Many of the surveys about IS job placement note the specific types of jobs that IS graduates achieve; every job has some aspect of specialization. For example, the recent U.S. Bureau of Labor Statistics projections for “The 10 fastest growing occupations, 2002-12” shows that the second fastest growing occupation in the United States is network administration, while eighth is software applications engineer. Academic qualification for both is a bachelor’s degree. Job postings also note special requirements: Liu and associates (7) found differential requirements for various sets of job skills in their search of online job sites.

**Hypotheses**

As noted earlier, there are different perspectives that one may use to evaluate decisions related to IS curriculum. For this findings reported in this study, we consider one perspective: the relation of IS curriculum to the job market. Based on the foregoing discussion, we examine the following two hypotheses (stated in the null form):

- \( H_1 \): The type of academic course specialization for MIS students is not related to job placement for full time MIS-related positions (vs. non IS-related positions).
- \( H_2 \): The type of academic course specialization for MIS students is not related to starting salary for full time jobs.

**METHODOLOGY**

**Data Collection**

The sample population for this study included all undergraduate MIS students at WWU who graduated in years 1998 to 2003. For each of these students, demographic and academic records were obtained from the university. (Note: All records were coded to preserve the anonymity.) Student records included demographic information (birth date, gender) and all courses taken at WWU. In addition, job placement data was obtained from the WWU Career Services Center. Each October the Career Services Center mails a survey to all students who have graduated from the university during the previous academic year. The survey includes questions related to employment status, employer, and annual starting salary. All survey responses received within six months are included with the survey.

**Study Variables**

The independent variables studied included the track specialization and number of IS-related courses completed. The dependent variables were starting salary and job placement. A brief discussion of each variable is provided below.

**Classification of Academic Course Specialization:** Students in WWU’s MIS program can pursue two informal academic specializations. One is the “Infrastructure” track which includes elective courses concerning telecommunications, network administration, and hardware. The second track is “Systems Development,” which includes elective courses from the MIS or Computer Science Departments with topics such as programming, advanced database topics, and WWW-based development. For the purposes of this study, if a student had successfully completed two or more electives in a given specialization area, then the student was classified as being a student who had “specialized” in the track. If a student had not taken two or more courses in any track, then the student was classified as having “No specialization.”

**Number of IS-related courses completed:** The value of this variable was determined by counting courses in MIS and Computer Science (not including basic computer skills courses) completed by a student.
**Job Placement:** This was based on the Career Services survey and was defined to be one of two values. Student who indicated that they had been placed in a full-time job in the MIS area were considered to have been successfully placed in a MIS position. Other respondents were classified as not being placed in a MIS position.

**Starting Salary:** To account for the effects of inflation, the starting salary reported on the survey was adjusted using the Consumer Price Index (CPI). The mean adjusted starting salary dropped significantly over the period from 2000 to 2003 (see Figure 1). This downward trend in IS salaries for the MIS graduates may be attributed to unfavorable conditions in the northwest US regional IS economy and job market following the shake out of the Internet industry in the early 2000s. This type of trend has not been limited to the northwest region, as it has been reported for the United States job market as a whole (1,8). As this type of salary trend could have a confounding influence on the data analysis; each salary was normalized by dividing the starting salary by the mean salary for the student’s graduation year. The normalized salaries were used for the data analysis.

**RESULTS**

**Sample and Respondents**
The sample population included 369 MIS students who graduated from WWU during the period of 1998 to 2003. Of this group, 37% were classified as having no specialization (n=138), 34% were in the “Systems Development” track (n=124), and 29% (n=107) were in the “Infrastructure” track. The average age of a student at graduation was 24.5 years, with 26% being female and 74% being male. The average number of IS-related courses completed was 8.5 courses.

The overall response rate for the Career Services survey was 45% (167 respondents). Statistical tests were conducted to determine if there were any differences between the respondent group and the non-respondent group with respect to the demographic data and independent variables discussed earlier – age, gender, number of IS-related courses completed, or proportion of students in tracks –
and no significant differences were found. Also, no statistical differences were found with respect to annual response rate over the period of the study.

**Statistical Analysis**

**Academic Course Specialization vs. Placement:** A plot of placement in full time IS-related positions vs. graduation year is shown in Figure 2. The placement rate has dropped over the past several years. A two-way contingency table analysis was conducted to determine whether academic course specialization was related to job placement (see Table 1). The placement rate for the students who did not specialize was somewhat higher than that of the other two groups, but no significant difference was found (Pearson Chi-Square = 4.10, df = 2).

<table>
<thead>
<tr>
<th>Type of Specialization</th>
<th>Placed in Full Time IS-Related Position (% placed)</th>
<th>Not Placed in Full Time Position (% not placed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Specialization</td>
<td>50 (83%)</td>
<td>10 (17%)</td>
</tr>
<tr>
<td>Development Track</td>
<td>32 (68%)</td>
<td>15 (32%)</td>
</tr>
<tr>
<td>Infrastructure Track</td>
<td>42 (70%)</td>
<td>18 (30%)</td>
</tr>
<tr>
<td>Total</td>
<td>124 (74%)</td>
<td>43 (26%)</td>
</tr>
</tbody>
</table>

**Academic Course Specialization vs. Normalized Starting Salary:** The salary data was evaluated using normalized salary values. 126 of the graduates provided data regarding their starting salary. Figure 3 displays a plot of normalized starting salary vs. graduation year, with the mean values shown in Table 2. As shown in Table 2, the students in the “Development” track had the highest normalized salary, while those in the “Infrastructure” track had the lowest salary. A one-way analysis of variance was conducted to evaluate the relationship between academic course specialization and normalized starting salary. A significant difference was found (F=3.59, p<0.03). Follow-up comparison tests using the Scheffe’s test were conducted to evaluate pairwise differences among the means. A significant difference (p<.05) was found between the means for the students who were in the “Development” track and the “Infrastructure” track, with the “Development” students having a significantly higher normalized starting salary. No significant differences were found between the “No Specialization” category and the other categories.

**Follow-up Analysis**

A key finding for this study is that course specialization was related to significant differences in starting salary. In particular, the students who specialized in the “Development” track had a larger starting salary than those who specialized in the “Infrastructure” track. Some students take more IS-related courses than others. Could it be that the number of courses...
taken may be a factor that relates to starting salary? In an effort to better understand our findings, we conducted a follow up analysis to examine the relationship between academic course specialization and the number of IS-related courses, placement, and starting salary.

**Table 2: Normalized Starting Salary & Number of IS-Related Courses by Track**

<table>
<thead>
<tr>
<th>Type of Specialization</th>
<th>N</th>
<th>Mean (Std)</th>
<th>Mean (Std)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Specialization</td>
<td>49</td>
<td>0.99 (0.22)</td>
<td>7.29 (0.91)</td>
</tr>
<tr>
<td>Development Track</td>
<td>41</td>
<td>1.07 (0.26)</td>
<td>10.51 (2.46)</td>
</tr>
<tr>
<td>Infrastructure Track</td>
<td>36</td>
<td>0.93 (0.22)</td>
<td>8.06 (1.29)</td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
<td>1.00 (0.24)</td>
<td>8.56 (2.16)</td>
</tr>
</tbody>
</table>

Academic Course Specialization vs. Number of IS-related courses: Table 2 shows the mean value of number of IS-related courses for students in the different tracks. (Only data for students who provided salary data is included.) Due to lack of homogeneity of variances, a Kruskal-Wallis nonparametric test was performed to evaluate differences in number of IS-related courses across the track groups. The test was significant (Chi Square = 53.0, p < 0.001). Tests were conducted to evaluate the pair wise differences across the groups. A significant difference exists across all pair comparisons, with students in the “Development” group taking significantly more IS-related courses than the “No Specialization” group, and the “Infrastructure” group taking more IS-related courses than the “No Specialization” group.

Number of IS-related courses vs. starting salary and job placement: Although the “Development” track group had a significantly higher number of courses than the other two groups, it does not appear that the number of courses is significantly related to starting salary. A correlation analysis between number of IS-related courses and normalized starting salary did not yield a significant correlation (Pearson Correlation of 0.12, p=0.165, N=167). Additionally, the number of courses did not appear to be related to placement, as an analysis of variance test found that the mean number of courses taken by students who were placed in an IS-related position was 8.58 (std = 2.19), while the mean number of courses for those who were not placed was 8.44 (std = 1.64) (F= 0.144, p = 0.704).

**CONCLUSIONS**

The findings lend modest support to the position advocated by several of the studies cited in this paper: specialization in IS curricula does matter – but the impact of specialization did not appear to have a strong overall influence on initial job placement for the sample that was studied.

Graduates of the WWU MIS program who specialized in academic tracks broadly defined as “system development” (i.e., web development, database, programming) had significantly higher starting salaries than those who specialized in “infrastructure” (i.e., hardware, telecommunications, networking). Students with “no specialization” were in between (see Figure 3). Results for placement rate suggest that specialization is not related to placement, as the decline in overall placement in recent years (see Figure 2) seems to have been shared by each group. While the number of IS-related courses taken by students in each of the various tracks were significantly different, these differences do not appear to be related to starting salary or job placement. This finding suggests that taking more IS-related courses (beyond the required number of IS courses), may not necessarily lead to better job prospects. Overall, the findings from this study provide
interesting food for thought for IS faculty who are considering the implications of general vs. specialized undergraduate IS programs on initial job placement.

Limitations and Areas for Future Study
This study is based on one MIS program that places most of its graduates in the U.S. Pacific Northwest. Although many of the employment trends noted herein have been common across the U.S., there might be some regional differences that would impact both placement success as well as the attractiveness of various specializations. We hope this study motivates other researchers to share our methodology to expand the attention paid to this issue.

The boom to bust experience over the period of the study might have an effect on our results. If the pundits (e.g., 8) are correct, then the downward trends of the last three years will be reversed. We intend to continue collecting data to see if our results hold over time.

This study uses job placement and starting salary as key outcome measures. However, there are other ways to measure student success in an undergraduate MIS program (e.g., long term career success, personal fulfillment, job location, etc.). In the future, we propose to follow up on alumni and learn more about their perceptions of the impact of their MIS education on their career.

REFERENCES