ISSN: 1545-679X

Information Systems Education Journal

Volume 6, Number 11 http://isedj.org/6/11/ February 11, 2008

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Abstract: The work to develop a model curriculum and guidelines for undergraduate degree programs in Information Systems has evolved over a number of years. The current version of this effort is called the Information Systems 2002 (IS 2002) model curriculum. Many Business schools have used these guidelines as a basis for improving their IS curriculum. However, we have found in a previous study that IS 2002 has not been fully embraced by many IS departments. This paper attempts to explore the reasons for this reticence to the IS 2002 curriculum. Five variables are identified for the analyses in this paper: 1) program ranking - whether the program is highly ranked or not, 2) program classification - whether the affiliated Business school offers a PhD program or not, 3) campus community - whether the campus community is urban or not, 4) institutional control - whether the Business school is part of is a public or a private institution, and 5) operating budget per faculty - whether the program carries a high or low operating budget per business faculty member. Our analysis has found that none of these five variables were found to be a significant factor, nor were the interaction effects among the variables. The result of this study shows that there is neither a distinct pattern nor a measurable reason among these variables as to why these programs show such a low compliance rate.

Keywords: information systems, education, business school, curriculum, undergraduate business program, IS 2002

Recommended Citation: Choi, Ulema, and Waldman (2008). Analyses of Compliance with IS 2002 Curriculum. *Information Systems Education Journal, 6* (11). http://isedj.org/6/11/. ISSN: 1545-679X. (Also appears in *The Proceedings of ISECON 2006:* §4132. ISSN: 1542-7382.)

This issue is on the Internet at **http://isedj.org/6/11/**

The **Information Systems Education Journal** (ISEDJ) is a peer-reviewed academic journal published by the Education Special Interest Group (EDSIG) of the Association of Information Technology Professionals (AITP, Chicago, Illinois). • ISSN: 1545-679X. • First issue: 8 Sep 2003. • Title: Information Systems Education Journal. Variants: IS Education Journal; ISEDJ. • Physical format: online. • Publishing frequency: irregular; as each article is approved, it is published immediately and constitutes a complete separate issue of the current volume. • Single issue price: free. • Subscription address: subscribe@isedj.org. • Subscription price: free. • Electronic access: http://isedj.org/ • Contact person: Don Colton (editor@isedj.org)

EDSIG activities include the publication of ISEDJ, the organization and execution of the annual ISECON conference held each fall, the publication of the Journal of Information Systems Education (JISE), and the designation and honoring of an IS Educator of the Year. • The Foundation for Information Technology Education has been the key sponsor of ISECON over the years. • The Association for Information Technology Professionals (AITP) provides the corporate umbrella under which EDSIG operates.

Analyses of Compliance with IS 2002 Curriculum

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ABSTRACT

The work to develop a model curriculum and guidelines for undergraduate degree programs in Information Systems has evolved over a number of years. The current version of this effort is called the Information Systems 2002 (IS 2002) model curriculum. Many Business schools have used these guidelines as a basis for improving their IS curriculum. However, we have found in a previous study that IS 2002 has not been fully embraced by many IS departments. This paper attempts to explore the reasons for this reticence to the IS 2002 curriculum. Five variables are identified for the analyses in this paper: 1) program ranking - whether the program is highly ranked or not, 2) program classification - whether the affiliated Business school offers a PhD program or not, 3) campus community - whether the campus community is urban or not, 4) institutional control - whether the Business school is part of is a public or a private institution, and 5) operating budget per faculty - whether the program carries a high or low operating budget per business faculty member. Our analysis has found that none of these five variables were found to be a significant factor, nor were the interaction effects among the variables. The result of this study shows that there is neither a distinct pattern nor a measurable reason among these variables as to why these programs show such a low compliance rate.

Keywords: information systems, education, business school, curriculum, undergraduate business program, IS 2002

1. BACKGROUND AND MOTIVE

Information Systems (IS) is an interdisciplinary field that incorporates many principles from the areas of computer science, decision science, information science, information management, and more. IS graduates enter a work force that is involved in information technology architecture and support, electronic commerce operation and management, human computer interaction and design, or other significant pillars of the scientific and business community. Training and educating IS students to the vast and diverse IS domain has always been recognized. The underlying key concept of IS education is to keep par with our continually changing business ecosystem. The careful balance between maintaining the academic views of IS principles, and simultaneously combining the essential business knowledge has always been a challenge. Therefore, the IS undergraduate curriculum must have courses that incorporate the core principles of the field and these courses need to include the current skills and knowledge that industry demands. Answering this call, a coalition of prominent IS industry leaders, academic constituents, and other IS-related stakeholders have attempted to describe the ideal undergraduate IS model curriculum. Periodically, the coalition updates the current model curriculum. Recently, the Association for Computing Machinery (ACM), the Association for Information Systems (AIS), and the Association of Information Technol-

ogy Professionals (AITP) have put together the latest undergraduate IS model curriculum, IS 2002 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems [IS 2002]. This updated model curriculum introduces ten IS courses shown in Table 1.

Table 1. IS 2002 Curriculum

Course ID	Course Title	Comments
IS 2002.P0	Personal Productivity with IS Technology	Prerequisite
IS 2002.1	Fundamentals of Information Systems	Required
IS 2002.2	Electronic Business Strategy, Architecture and Design	
IS 2002.4	Information Technology Hardware and Software	
IS 2002.5	Programming, Data, File and Object Structures	
IS 2002.7	Analysis and Logical Design	
IS 2002.3	Information Systems Theory and Practice	Electives
IS 2002.6	Networks and Telecommunication	
IS 2002.8	Physical Design and Implementation with a DBMS	
IS 2002.9	Physical Design and Implementation in Emerging Environments	
IS 2002.10	Project Management and Practice	

This is an update from the IS 1997 version with only some minor changes. IS 2002.2 'Electronic Business Strategy, Architecture and Design' is new, and IS 2002.P0 'Personal Productivity with IS Technology' is a course that contains material from two previously listed courses. The addition of an electronic commerce course is an indication of the coalition's intention to keep the curriculum current and useful. If an IS program fully implemented all of these IS 2002 courses, then the program is considered fully compliant with IS 2002.

To get a snapshot of IS 2002 compliance within IS departments across the U.S., the curriculum information for each IS department had to be collected. To do this, a study cohort was created from representative IS departments across the United States. Each IS department's web site was carefully studied against the IS 2002. Information such as major core courses, technical electives, business electives, general requirements, total number of credits required, and other significant information were collected from the department web pages. Information that was harder to get from these web sites such as operating budget per full-time faculty member was obtained through other sources such as, the Association to Advance Collegiate Schools of Business (AACSB) web site. Manually, these sources were excavated repeatedly to provide input for this study.

In comparing the curriculum of each IS department to IS 2002, we found that only one IS department was fully IS 2002 compliant. In other words, only a single IS department implemented all ten courses of IS 2002. Even the more prominent IS programs fail to fully comply with IS 2002. It is odd that many IS programs fail to comply with IS 2002 when IS 2002 was authored by a coalition of IS program educators and administrators. Earlier, a study reported the results of its general survey (Waldman, et al., 2005). The notable findings were that many IS programs are only partially complying with IS 2002, and that the schools located in the northern region of the US exhibited a strong correlation between their programs and the IS 2002 compliance. However, the study did not provide detailed statistical analysis with regards to locating possible variables that may have influenced on the compliance of the IS programs. Identifying and recognizing the variables that play a part in IS 2002 adoption might be helpful in determining the reason for poor IS 2002 compliance.

Here, the IS program is a common collective term that represents programs with synonymous names such as Management Information Systems (MIS), Business Com-

puter Information Systems (BCIS), Computer Information Systems (CIS), Information Systems & Manufacturing (ISM), Business Information Systems (BIS), and Management Science and Information Systems (MSIS).

This study is conducted as an attempt to address some of these questions. The major contributions of this study are the discussion of the selected influencing variables, the statistical analysis on the degree of each variable's influence to IS program compliance, and the interaction effect among the variables. The paper ends with a brief conclusion section.

2. VARIABLES INFLUENCING IS 2002 COMPLIACNE

A preliminary literature review uncovered that only a few studies directly related to IS model curriculum utilization have been published (Daigle, et al., 2004; Landry, et al., 2001; Ulema, 2004). Furthermore, empirical literature that focused on IS model curriculum compliance issues or even any reports and discussion forums about the issues were virtually nonexistent. There was no foundation that we could build upon. Consequently, this investigation is based on the authors' earlier work (Waldman, et al., 2005). The variables from the authors' earlier work along with the newly selected variables are reexamined in this study.

All together, five variables are examined in detail here. The first variable is 'program rank.' The reason for selecting this variable is based on the assumption that the programs with national recognition or high ranking by academic evaluation entities would achieve significantly higher compliance than the programs without those. It is reasonable to assume that a nationally recognized or highly ranked program would aggressively conform to the standard in order to maintain a high level of quality. In this study, the source used for program ranking is the "Best Business Programs" list from US News and World Report, "America's Best Colleges – 2004 edition" [US News 2004]. America's top tier business programs were ranked on page 114 of [US News 2004]. We initially believed that a top business program would also achieve a high degree of IS 2002 compliance.

The second variable is 'program classification,' which refers to whether a program offers a Ph.D. degree in IS or only non-Ph.D. degrees (i.e., BS and/or MS degrees). The assumption is that a program that offers Ph.D. degree in IS would achieve significantly higher compliance than a program that does not offer Ph.D. degree. A program that also offers a Ph.D. degree would be able to share its resources - research facilities, faculty, research opportunities, and collaborations with industry – and this would probably enrich the undergraduate program as well. Another argument for selecting this variable is that an institution focusing on undergraduate education may be inclined to be more compliant with IS 2002, since, after all, IS 2002 is a model curriculum for undergraduate IS education.

The third variable is 'campus community.' For this variable, the programs were divided into two groups: one group consisted of programs that are located in an urban setting and the other group where programs are located in either a suburban or rural setting. An earlier work showed that there is a difference among the programs' level of compliance based on the region where the IS program is located (Waldman, et al., 2005). With this variable, we wanted to see whether the setting of the campus would make a difference in the compliance.

The fourth variable is 'operating budget per faculty member.' This refers to the level of a program's financial resources. One might assume that a program with a higher operating budget would achieve significantly higher compliance than a program with a leaner operating budget. Perhaps a robust financial capability might empower the program to offer more courses and attract more faculty members. This then would facilitate the program to fully comply with IS 2002. Here, the operating budget figures are obtained from the AACSB web site [AACSB 2006]. For this variable, the programs are classified into three groups: high, medium, and low. The high group is consists of programs with operating figures that lie in the upper 40%, and the low group is comprised of programs with operating figures that lie in the lower 40%. The medium group consisted of programs that fell in between. For the purpose of this study, the medium group

was omitted and only the high and low groups were compared and contrasted.

The fifth and last variable is "institutional control." This variable is used to determine whether a public or private designation affects the compliance.

3. ANALYSIS OF INFLUENCING VARIABLES

The data for the aforementioned five variables was diligently acquired from web sites of each program and from the AACSB web site. Each program's web site was carefully studied and the number of implemented IS 2002 courses was counted and recorded.

To carry out the statistical analyses, the variables need to be identified as dependent and independent variables. The independent variables are: program rank, program classification, campus community, institutional control, and operational budget per faculty. The dependent variable is the number of implemented IS 2002 courses.

Box Plot Analysis:

After aligning both independent and dependent variables and their corresponding values, box plots were created to illustrate the attributes of each variable as shown in Figure 1. A box plot is a useful way of presenting summary statistic values – minimum, lower quartile (25%), median, upper quartile (25%) and maximum. The box represents 50% of the data set and the thick middle line cutting across the box is the median. By examining Figure 1, one may conclude that the "low" budget schools comply better than the "high" budget schools, that the "suburban" schools comply little better than the "urban" schools, that the "public" schools comply better than the "private" schools, and that the "low" ranking schools comply better than the "high" ranking schools.

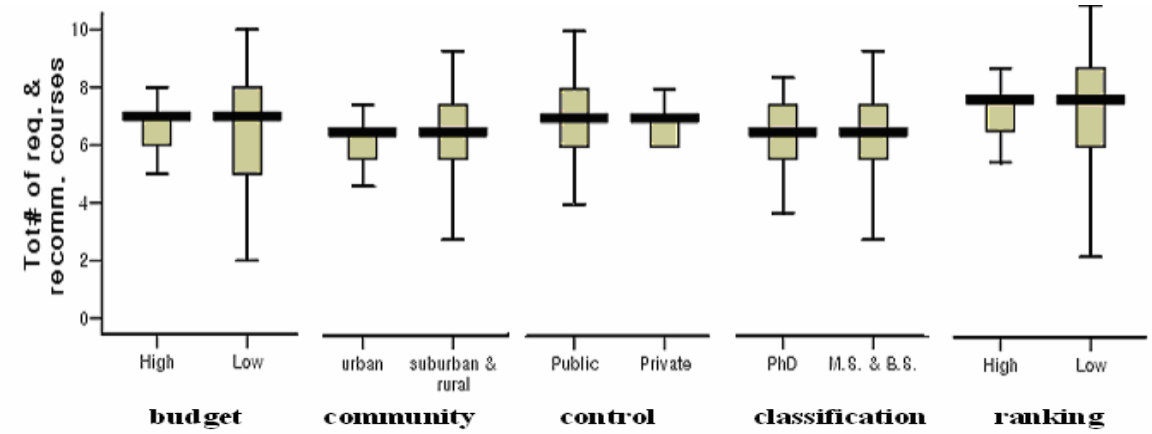

Figure 1. The Box Plots of the Variables

However, a closer examination of Figure 1 shows that for each variable the median values of two binary categories are almost the same, around seven courses. Therefore, this can be interpreted as inferring that no variable is significantly more influential in the compliance. However, this may be a premature conclusion and therefore further analyses are necessary.

Point-biserial Correlation Analysis:

To determine a method for further analysis, we examined a number of statistical analysis approaches. As the variables are in binary form (i.e., A or B), the chosen statistical analysis method must accommodate this attribute. One such method is the point-biserial correlation, which provides a measure of association between a continuous variable and a dichotomous variable (Field, A., 2003; Rowntree, D., 2003; Rosenthal and Rosnow, 1991). A dichotomous variable is a special categorical variable for which only two discrete values exist (e.g., male or female, pregnant or not pregnant). A continuous variable is a variable that can have multiple set of values (e.g., household income, college entrance exam scores). In

this study, the dichotomous variables are the binary forms of five variables, the independent variables; and the continuous variable is the number of required and recommended courses of IS 2002, the dependent variable. Assume that X represents the dependent variable, and Y represents the independent variable, with possible values of 0 or 1. The calculation for the point-biserial correlation coefficient (designated by the letter r) is provided below:

$$r = \frac{\left(\bar{X}_1 - \bar{X}_0\right)\sqrt{p\left(1-p\right)}}{S_X}$$

where

$\bar{X}_0$ is the mean of X when Y=0
$\bar{X}_1$ is the mean of X when Y=1
S_X is the standard deviation of X
p is the proportion of values where Y=1

The 'program rank' calculation is used as an example to demonstrate the use of this equation. Y is the binary value, either 'highly ranked,' value 0, or 'not highly ranked,' value 1, and X is the dependent variable, the number of IS 2002 courses that each program has implemented in its curriculum. In this example, X0 = 6.8, X1 = 6.6, SX = 1.6220, and P = 24. The calculation yields the coefficient value r = -0.070. Table 2 shows the results of the coefficient calculations for all five variables as well as the result of the (1-tailed) significance, r2, and variability.

Table 2. Variable Impact Analysis Result

	Variables	Point-biserial corr.coeff. (r)	significance. (1-tailed)	r^2	Variability
1	program rank (high or low)	-0.070	0.323	0.0050	0.50%
2	Program classification (PhD or not)	0.019	0.451	0.0004	0.04%
3	Campus community (urban or not)	0.130	0.197	0.0169	1.70%
4	Institutional control (public or private)	0.125	0.207	0.0160	1.60%
5	Op. budget per faculty (high or low)	0.071	0.322	0.0050	0.50%

A significance value of a variable shows whether the corresponding assumption for that variable is rejected or accepted. For example, Table 2 shows that the significance value for the variable one, program rank, is of 0.323. The assumption for this variable is that highly ranked IS programs show significantly higher IS 2002 compliance than the lowly ranked IS programs. The significance value of 0.323 for this variable indicates that there is 32.3% chance that the above assumption is untrue. Typically an assumption is accepted when it shows only 5%, or significance value of 0.05, chance that the assumption is untrue.

The "variability" is another important value that provides significance information about the impact of these variables on the compliance. The variability is calculated as the percentage of the square of the coefficient value. For example, Table 2 shows that the point-biserial correlation coefficient for the 'program rank' variable is -0.070, which has 1-tailed significance value of 0.323. Then, r2 = (0.070)2 = 0.005. This exhibits that the program ranking variable accounts for only 0.5% of the variability on the compliance.

Table 2 shows that all five variables reported have very minimal variability values; the highest value is a mere 1.7%. Additionally, the numbers show that there are no significant differences between the means of two binary categories of each variable. In conclusion, this analysis suggests clearly that none of these five variables bear any significant impact on the IS 2002 compliance of the IS departments.

Interaction Analysis:

Another intriguing area is the effect of the interaction among the variables. A combination of two variables may pose salient interaction effect on the dependent variable. To determine this possible interaction effect, the two-way analysis of variance for Independent samples (ANOVA) is used (Fields, 2003). The two-way ANOVA determines whether the two independent variables interact with respect to their effect on the dependent variable. If the significant value is less than 0.05 then there is a significant interaction effect from the combination of two variables. As shown in Table 3, all possible combinations exhibit significant values more than 0.05 which means no two variables show any interaction effect. For example, the combination of the variables one and two – 1. vs. 2 - shows no interaction effect.

Table 3. Interaction Effect

Comb.	1 vs. 2	1 vs. 3	1 vs. 4	1 vs. 5	2 vs. 3	2 vs. 4	2 vs. 5	3 vs. 4	3 vs. 5	4 vs. 5
Sig.	0.509	0.755	0.602	0.914	0.262	0.875	0.458	0.962	0.460	0.820

4. CONCLUSION

This study is conducted to provide detailed statistical analyses with regards to locating possible variables that may have influenced on the IS 2002 compliance by the IS departments. The major points of this study are the discussion of the influencing variables selected, the statistical analysis on the degree of each variable's influence to the compliance of an IS program, and the interaction effect among the variables. Five variables identified for the analysis are: program ranking, program's degree classification, campus community (urban vs. rural, institutional control (public vs. private), and the operating budget per faculty.

The analyses carried on in this study conclude the following:

The five aforementioned variables do not play a significant role in the IS 2002 compliance.

The different combinations of those five variables do not play a significant role in the IS 2002 compliance.

Along with an earlier work by the same authors (Waldman, et al., 2005), the findings of this study indicate that the question of compliance is a tough problem to deal with and the variables identified in Section II have marginal impact on the compliance. Perhaps, a more general and high level discussion of this problem of low compliance could be more enlightening.

At a high level, the reasons causing this low compliance can be discussed under four categories:

Local considerations are more influential than IS 2002 model curriculum. For example, local industries and business employers may drive to some degree in institutions' IS curriculum development.

IS 2002 is not a good curriculum: It is generally agreed that IS 2002 is a guideline; therefore this category is not worthwhile to discuss further.

IS 2002 is a good model curriculum, but some of its individual units are difficult to implement. There is little evidence that the IS 2002 courses are difficult to implement; therefore this item too is not worthwhile to investigate further.

IS 2002 is a good model, and its individual units are easy to implement, but the cause probably lies within the culture of the institution and/or the mission objectives of each program. It seems that the reasons in this category are most likely to play sig-

nificant role in the low compliance of the IS 2002 model curriculum.

There are a number of ways to increase the compliance level. An approach could be to tighten the accreditation process to force the IS departments to adapt the model curriculum. For example, AACSB can make IS 2002 a requirement, rather than a recommendation, during the accreditation process. A phased and systematic accreditation process may give the IS programs an opportunity to gradually increase the level of compliance. Another approach to increase the level of compliance could be a better effort in publicizing the model curriculum. An update to IS 2002 is expected to be available in near future. A concerted effort to publicize via workshops, conferences, and articles will play a key role in raising its compliance level.

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