MIS Curriculum Evaluation: A Methodology for Ongoing Web-based Alumni Assessment

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Abstract

Information systems curricula at schools of higher education are constantly under pressure to update curricula to reflect current industry trends. This pressure comes from knowledge of industry expectations, requirements of accrediting bodies to provide evidence that graduates are provided with necessary knowledge and skills opportunities, and self-imposed expectations of IS faculty to prepare graduates for future employment. This paper adds to the body of research by introducing a mechanism for ongoing curriculum assessment by information systems alumni. The study involves conversion of a previously paper-based survey to a secure web site designed to capture alumni curriculum perceptions following a one-year period of employment.

Keywords: IS education, IS curriculum, curriculum assessment, online questionnaires, IS skill requirements

1. BACKGROUND

Periodic assessment of knowledge and skills requirements for business students in an information systems environment is a must if business schools are to be efficiently reactive to industry requirements when making changes to their curricula. This need to react to industry requirements is most evident as executives, frustrated by the IT skills gap, are known to be forming alliances with colleges, universities, and training centers in an effort to synchronize what's being taught in the classroom with what's needed in the office (McGee 1998).

Frequent assessments from relevant respondent groups will contribute to the efficient response of academia to industry requirements. Respondent groups frequently used in curriculum research include students about to graduate, recent alumni, supervisors of graduates, IS faculty, non-IS faculty, and program directors/coordinators (Ramakrishna 2000).

Emphasizing the need for continuous curriculum assessment, relevant research describes the gap between IS expectations and academic preparation (Trauth, Farwell, and Lee 1993). Trauth, et al (1993) identified two main areas of difference as the need for integration of fast moving technologies and the need to manage a career education. In addition, research describes methodologies for skills/knowledge assessment in a frequent, timely manner from relevant respondent groups (Chrylser and Van Auken 1999; Hanchey 1995-1996; Ramakrishna 2000). Ramakrishna (2000) examined the similarities among different respondent groups in assessing information technology skills and information technology knowledge. ANOVA results indicate that when knowledge and skills categories are combined, recent alumni, supervisors of graduates, IS faculty, and program directors perceptions of knowledge/skills requirements is the same. Thus, researchers can avoid overusing respondent groups for periodic[1]c surveys and attempt to target groups most likely to provide higher response rates.

Asking alumni to evaluate course content of required and elective courses, Chrysler and Van Auken (1999) analyzed the comparative value of courses and correlated the value of each course to the length of time since the student graduated. The methodology presented allows MIS faculty to periodically determine which courses are highly valued and which courses need to be redesigned or replaced. The goal is to assure that a MIS program offers courses students evaluate as having a strong content value.

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Alumni are important evaluators of program effectiveness. Measuring alumni perspectives provides an opportunity for detached objectivity from previous participants in a program. Recent alum can often differentiate between skills/knowledge that were a result of the educational experience and those skills promoted in the employment environment. In addition, alumni provide an appropriate context for establishing long-term measurement of objectives.(Hanchey 1995-1996).

In addition to establishing alumni as the respondent group and providing for an evaluation of required and elective course content, what other information should be obtained from respondents? Hanchey (1995-1996) suggests that survey instruments should consider questions of demographics, first job experiences, current job experiences, cooperative education experiences, and questions that elicit responses about the strengths and weaknesses of the MIS program. Questions for analysis might be organized into categories of skills and knowledge such as technology, business administration, and interpersonal relations. Students should report the most useful courses/skills in both major and non-major courses, technical skills considered most important and software and programming languages currently used.

In an effort to identify skills needed now and in the near future for IT, FedEx in the summer of 1997, combined with the University of Memphis and a host of vendors to outline a list of recommendations for curricula that represent needed business skills (McGee 1998). The template suggests course offerings for three levels of study. Table 1 summarizes this suggested list of baseline requirement.

In a more recent study, Martz and Landof (1999-2000) compared student and recruiter perceptions about what skills are important for an information systems career now, in three years, and for career advancement. Results indicated that students are failing to recognize the value of problem solving and analytical and conceptual skills, while tending to overvalue the areas of general legal knowledge and forecasting/predicting. Again in this study, characteristics are divided into a body of general skills and IT skills. The top five skills in each area perceived necessary for advancement were identified.

Table 1
Suggested Course Offerings by Level

General Education	Information Systems baseline	Internet certification
Accounting	Computer concepts and architectures	Building Web applications
Business management	Database concepts including SQL	Developing business strategies for Web applications
Project management	Data warehousing	
Resource and time management	Relational technology	
Organizational theory	Overview of C++ and Java	

2. PURPOSE OF THE STUDY

Consistent with the need to react to industry expectations of information systems graduates, faculty at a Midwest liberal arts university have begun plans to implement a mechanism for ongoing feedback from recent graduates. Boasting the most extensive liberal arts core curriculum for undergraduates of any Jesuit university, more than half of the required hours for graduation are core courses. This dedication to prepare students "intellectually, morally, and spiritually" to take their place in a rapidly changing global society places severe restrictions on the number of available hours for coursework in the management information systems major. Ongoing feedback from students will allow faculty to analyze a comparative value of courses and the value of courses correlated to length of time since graduation. This study describes the design and implementation of a web-based survey for capturing data from alumni in an ongoing basis.

3. METHODOLOGY

The design of web-based surveys requires much the same rigor as that of paper-based surveys. In this research, we follow the design rules and methodologies for web-based surveys presented in four steps by Lazar and Preece (1999). The four steps are:

1. Design the survey on paper.
2. Choose a methodology.
3. Turn the paper survey into a web-based survey
4. Inform the population of interest of the existence of the survey (Lazar and Preece 1999).

Design the Survey on Paper

In the fall of 1999, a survey of MIS alumni in the 1990's was administered. Based on an examination of the literature, the survey attempted to capture relevant demographics, information about first full-time employment, information about current employment, and a likert-scale evaluation of business courses, information systems courses, and a similar evaluation of coverage of IS skills. One hundred thirty (130) surveys

were distributed and 41 returned (31% response rate). In addition to the task of analyzing student responses, developers of the survey project were concerned with improved response rates and a mechanism for continuous assessment. The paper design complete, attention was focused on designing the web-based instrument.

Choose a Methodology

Choosing a methodology for web-based surveys requires consideration for network access and population definition (Lazar and Preece 1999). Consideration for network access must include methods for requesting survey participation as well as having respondents actually fill out and submit the survey. Paper-based surveys generally assume the use of the traditional mail system. E-mail based surveys differ only in the fact that the survey is in electronic form and the electronic mail system replaces the postal system.

On the other hand, Internet-based surveys can be made easily accessible from anywhere in the world, but we can choose between electronic and standard postal services for requesting survey participation. Lazar and Preece (1999) suggest the possibility of using a hybrid methodology, making use of both online and paper-based surveys. However, since all of our potential respondents have been educated in Information Technology, and likely work with technology, we will assume that they have access to the Internet, either at work or at home. We will, therefore, use a web-based survey exclusively. A more critical issue concerns the methodology for making alumni aware of the survey. Further discussion on this topic will follow in the section on informing the population of interest about the survey.

Population definition for web-based surveys considers the need for making population estimates based on a well-defined population and employing random sampling techniques. For purposes of this study, the population is well defined and exists in the form of graduate statistics in the registrar's database. Our goal is to elicit as many responses as possible from the entire population in an ongoing basis. It may be necessary to employ a mechanism for ensuring that only one survey response per IP address is accepted to avoid instances of multiple responses (Lazar and Preece 1999).

Turn the Paper Survey into a Web-based Survey

After an effective paper survey was developed, the next logical step was to develop a database to store the data. The creation of a database serves a multipurpose. First, it allows the data collected to be stored in an organized, easily accessible manner. Next, it provides an efficient means for data extraction to perform statistical analysis to help discover patterns and trends. Third, a well-designed database provides an easy and efficient means for data entry, through the use of forms, and data reporting through the use of reports. Last, the database can be converted into a Web-based form for more wide-ranging and easier collection of data from alumni. This provides the opportunity to meet the ultimate goal of reaching the greatest number of alumni in the most cost-effective, quickest, and accurate manner possible.

Database design. When deciding how to create a database based on a paper survey, several considerations must be taken into account, which are consistent with any good database design. Three basic issues that were addressed from the start were, 1) defining what data needs to be collected; 2) from whom the data will be collected, and; 3) how it will be collected, stored, and organized. Initially, the database should be mapped out on paper into class diagrams to help identify the primary entities to be contained in the database.

For our purposes, we divided the entities into three broad categories, which were based upon the design of main sections of the paper-based survey: Personal Data, Occupational Experience, and Curriculum Experience. Each entity in essence became an individual table to store answers to the survey questions using Microsoft Access. The main properties for each entity, (questions in each section of the survey), became the fields for each table. The tables were then linked to one another via logical relationships through a user record number. This served as the primary key, distinguishing each survey respondent from one another. After this, further subdividing and normalizing of the table structure was required to ensure data independence and reduce redundancy (Post 1999).

Once the table structure was set in place, an effective means to input and access the data would be needed. The database was designed to input data manually from paper-based responses or to input data automatically through electronic data collection. The creation of a well-designed form provides for this. Special consideration was placed on the ease of data entry, such as providing correct tab order to allow users to keep their hands on the keyboard as well as subdividing large forms into a series of smaller ones. The latter improves organization and allows for easier data input while not having to vertically scroll through multiple pages of questions. Once a viable form had been designed, the data could be input into the tables through the form interface. With completed paper-based surveys already returned from current Information Systems graduates, we were able to test our survey form from both technical and usability perspectives. This provided the opportunity to debug the database and further refine the design.

Use of database for statistical analysis. Once the database was populated with the survey records from data of completed paper forms, a means for data extraction and statistical analysis is necessary. By exporting tables from Access into Microsoft Excel, SPSS, or any other statistical analysis suite, statistical tests can be performed to provide meaningful output

from the data. This step in the process requires little to no additional effort in terms of data entry, as the data is already organized into a spreadsheet format. Again, this provides for easy manipulation and extraction of the collected data.

Web-based integration of the database. With the design of the paper survey and survey form in Access designed, tested, and completed, the survey can then be integrated into an interactive web-based form. The survey form will then be accessible to an unlimited number of respondents via the World Wide Web. There are several advantages of implementing a Web-based survey over using the traditional paper survey. Some of these advantages include: 1) the virtual elimination of paper, postage, and copying costs; 2) elimination of the time and money spent on data entry; 3) receipt of survey responses in a timely manner; and 4) distribution of surveys without consideration for geographical area.. In addition, the possibility of incorrect data entry is lessened with each respondent entering his or her own responses into the Web form, which is submitted directly to the database.

There are multiple ways to go about designing a web-based survey, each ranging in different degrees of complexity. In the past, connecting web forms to databases required extensive knowledge of Perl and CGI to interact with the web server. With today's advanced software, the integration of databases on the Web is no longer limited to expert programmers. By utilizing a combination of database management tools and Web design suites, such as Microsoft Access 2000 and FrontPage 2000, a web-based form can be created from an existing Access Form. The first step in the process is exporting each of the forms from the current database using the built in option in Access. The form should be saved as an Active Server Page (ASP), Microsoft Internet Information Service (IIS), or some other format to allow for the interaction and linking of survey responses between the web server and the database. Once the form is saved in a format capable of accepting and sending information to a database, then the ASP form can be imported into a Web design suite such as FrontPage 2000 (Randall 1999). From here a new logical connection must be established from the form to the database. In addition, each input box, drop-down menu, or other form-based method of collecting data must be linked to the appropriate fields in the Access database. At this point, the web-based form can be published to the web server for data collection.

Design guidelines to consider in web-based surveys. In designing the imported web-based form, special care must be given to usability for individuals completing the survey over the web. A good form should contain many elements to assist the user in any way possible. If possible, it is wise to implement help menus, tips, and clarification of questions. Electronic survey forms can facilitate this process. By providing a usable form, the probability of receiving more completed forms with "good" data is greatly increased.

A well-designed survey form should adhere to the same guidelines that hold true for any Web design. These include designing for 1) varying screen height and widths, 2) different resolutions and colors, 3) different versions of major browsers (Internet Explorer, and Netscape) and, 4) cross platform implementation (Mac OS, Linux, etc.). A good guideline to follow is to size the contents of the form on the screen so that regardless of what screen size a user has their monitor set to, he or she will not be forced to scroll horizontally in an Internet browser window. Also, the amount of vertical scrolling should be considered. Most users will be less inclined to fill out a form that appears daunting, having to scroll vertically for more than two pages. Many survey respondents will be accessing the web form using computers with older video cards and various screen/color settings. Care should be taken to provide for the most web safe colors to ensure that the respondents can fulfill the ultimate goal of completing the survey. In addition to various speeds and settings on computers, users will be accessing the survey using different types and versions of browsers. It is essential that the design and coding on the survey form not contain browser or platform specific controls and plug-ins. Users that are forced to download certain components or use certain browsers to complete the form will generally be reluctant to complete a voluntary survey. Every effort should be made to remove obstacles that inhibit the ultimate goal of maximizing data collection.

Special considerations. With the implementation of the survey on the Web, new issues are brought to the forefront. One of the main issues to consider is security. Another related consideration is the possibility of gathering duplicate data. Some form of security should be used to ensure that researchers are gaining responses from the pre-selected population. A combination of methods can be employed to ensure this security. First, the Web site can be setup to be password-protected. This is easily implemented, and provides a simple method of keeping people from around the world from finding the web survey and filling it out. Another possibility is the requirement of a special ID number to be entered into the data form. Only survey forms with a valid ID are able to be validated and submitted. This will help prevent erroneous data from being part of the database.

Another issue of concern is the receipt of duplicate data. Many times, users are accustomed to double-clicking buttons. When a form's submit control button is double clicked, the contents of the form will be submitted twice to the database. To protect against duplicate records by the same individual, a data validation check should be performed to ensure that the primary key is not duplicated. If this is the case, then an intuitive message

should be returned to the user, informing him or her that their survey has already been recorded into the database.

Inform the Population of Interest of Interest of the Existence of the Survey

As mentioned earlier, this phase of the process is a critical issue. The most well designed database and survey form are useless if we cannot effectively reach survey participants or if they do not fill out and submit the form. Lazar and Preece (1999) suggest various electronic methods including posting of a message to a newsgroup, bulletin board or listserv, or by directly e-mailing the population. However, these electronic methods assume that potential respondents regularly participate in newsgroup or listserv functions, or that current, accurate e-mail addresses are available. In our situation, none of these circumstances hold true. While we might encourage alumni to access a university-sponsored discussion group, listserve, or Web-site, regular participation is unlikely. Response rates from such methods would probably be very low. Hopefully, in the not-too-distant future, the alumni office will begin to track e-mail addresses, but this is not currently the case. We therefore, revert to the traditional mail system for soliciting survey responses.

Postcards will be sent to alumni after one year from their graduation date. Each postcard will contain a carefully worded request for response, along with a Web address for the survey, a unique identification code, and a password. The Web address will be kept as simple as possible to encourage response. This is not an ideal situation, since it relies on participants accessing the Internet, entering the Web address, and then entering an ID and password before getting the survey itself. An e-mail solicitation could eliminate several of these steps by providing a direct link to the survey and automatic entry of the ID.

4. SUMMARY AND CONCLUSIONS

We are confident that the methodology described in this paper provides an easy-to-use platform and an independent mechanism for collecting valuable data from alumni. The integration of the database and the Web-based survey allow us to conduct long-term data collection efficiently and accurately. The database can provide extensive reports used in an ongoing evaluation of the information systems curriculum. The database and survey can be generated and maintained using readily available tools and the survey can be deployed to any operating system, hardware, or browser platform. Provision for access to alumni e-mail addresses in the future will improve the process.

Complete and accurate data from our former students can be a valuable asset for curriculum development in the dynamic world of information technology. It is our hope that this project will help to achieve these goals and encourage others to experiment with technologies to further improve the process.

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