In this issue:

Fundamentals of Information Systems Alternatives

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Fundamentals of Information Systems Alternatives

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Abstract

Diverse computer knowledge of incoming college freshman makes it difficult to teach the IS 2002.1: Fundamentals of Information Systems course included in the IS 2002 Model Curriculum. Some students come in with several years of high school and personal computer use while others have rarely used a computer. The majority of students are somewhere between the two extremes of several years of use and no use. Most have had some use of word processing to prepare reports in high school and Internet use for entertainment and research. A one-size-fits-all approach to computer or technology literacy does not meet the needs of the students and causes student dissatisfaction with the computer literacy course. Colleges and universities need to examine alternatives to provide the needed computer literacy skills and increase student satisfaction while trying to maintain the credit hours generated by this course.

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1. INTRODUCTION

Most universities have a computer or technology literacy requirement that is similar to the IS 2002.1: Fundamentals of Information Systems course. Other terms are information literacy, IT competency, and information fluency. Information fluency from its definition would appear to encompass computer literacy.

Information fluency is "when critical thinking skills are combined with information literacy and relevant computing skills" (McEuen, 2001). The terms information literacy and fluency are derived from efforts by American Association of School Librarians, Association for Educational Communications Technology, and Association of College and Research Libraries (American, 2004; National, 2004).

It would appear that most universities would be trying to achieve information fluency/literacy and not just computer literacy. Students should be taught the application of computers in their chosen major and not just software applications (Lauckner, 2001).

All universities would like students to solve problems by collecting necessary information, applying critical thinking skills to evaluate and analyze it, and forming and presenting their findings in the most efficient way. The most efficient way would be to use information technology. In some cases the university general education requirement would be closer to computer skills in common office software since it does not include

any technology concepts requirement. Students need to understand the core concepts of computers and information processing to appropriately apply technology to solve problems.

Information fluency skills are appropriate to all majors of the university, not just schools and colleges of business. Schools and colleges of business may want to expand the goals of their fundamentals of information systems course to incorporate the goals and standards of the library associations.

Normally the university requirement is included in general or liberal studies core. The reason for this requirement is recognition that fluency in using computers to create information is necessary in the electronic fast-paced environment of our business and personal lives. The difficulty with this requirement is the uneven proficiencies of students coming to the university. In some states and school districts students are not required to demonstrate any computer literacy to graduate from high school. In other states they have a state requirement of some level of computer literacy that is assessed for high school graduation (Public, 2001).

Since there is no uniform computer literacy requirement at the state level, our incoming freshman have a very wide range of computer proficiency. Some school districts have a computer literacy course and others only have a programming course that is normally only taken by students interested in mathematics. Even if a computer literacy course is available the school district requires students to take a prerequisite course in keyboarding, a boring course that most students will pass on. A recent newspaper article stated that "about the only place where they are not immersed in technology is in school" (Kossan, 2004).

In a recent semester one of the authors taught the fundamentals of information systems course for our institution and conducted an informal survey of incoming proficiency. Over half of the students had word processing and some Internet skills. Less than 10 percent had any proficiency in spreadsheets, database, and presentation software. The students who claimed word processing and Internet skills learned it at home and not from a formal course in high school. While observing the students in the computer lab during the semester it was obvious that their Internet skills were very rudimentary, as were their word processing skills.

To see how good their Internet skills were they were given an Internet search assignment without any instruction on search techniques. The assignment took most students the entire one hour and forty-five minute lab period to find any useful information. They had no idea on how to refine the topic into key words or effectively use the search engines.

Students who claimed word processing skills were able to enter text (in most cases slowly because they did not take the keyboarding course) and to do some formatting such as typeface, style, and size of fonts. Very few were able to change margins, paragraph attributes, or create and use a simple table. Spell checking was not performed unless specifically required. These findings are not unusual.

At Southwestern University they found that students enter the university with basic word processing, e-mail, and Internet skills. However, they do not have "conceptual knowledge of computers and technology" (McEuen, 2001). Students are not able to do effective Internet research because they do not have a conceptual understanding of how information is organized on the Internet or an understanding of how a database is organized. It is believed that student self-reporting of their computer skills is in excess of reality and the skills they learn on an informal basis are not the same as those the universities are requiring.

2. PURPOSE OF THE STUDY

The purpose of this study was to discover and evaluate alternative forms of ensuring computer literacy for university students and to recommend an alternative approach that tries to better balance meeting the needs of students while maintaining student credit hours. Our university has been using a two credit hour concepts course and a one credit hour lab for the software skills. As observed by one of the authors this one-size-fits-all approach may not be the best approach. All students regardless of their incoming background are required to take the same con-

tent without any test-out options, except for CLEP.

3. RESEARCH METHODOLOGY

Our university has a current list of "peer institutions" and a proposed list of "peer institutions." This list is used to compare curriculum, growth, administrative and faculty salaries, and other purposes. The search for computer literacy requirements and alternatives started with a review of the Web sites of both the current and proposed "peer institutions." Lastly a search was conducted using several search engines using various search terms along with computer literacy: credit by exam, proficiency exam, and exam alternatives. The results present findings from both "peer" and "non-peer" institutions.

This review approach was chosen instead of a survey to capture the requirements that are stated in college and university catalogs. In most cases the data on the requirements is readily available on the Web sites of the institutions and we would not have to rely on institutions returning the survey data.

4. RESULTS OF SEARCH

The results were classified under the following four areas:

1. University assumes or expects computer literacy and provides assistance for computer literacy but does not have a course or certification requirement.

2. Literacy examination or certification must be completed during the first two years of university enrollment. It is assumed that most incoming students have the necessary skills so little if any resources are needed.

3. Required computer literacy course, with a possible CLEP option.

4. Required computer literacy course with several test-out options.

Each of the alternatives will be discussed and a recommendation will be made.

Computer Literacy Assumed or Expected

Computer literacy is assumed and in some cases not specifically required by the university. In states that have a high school computer proficiency requirement this may be appropriate (Public, 2001). If most of the incoming students to a college or university were in-state residents they could assume that the students possessed the necessary skills. Colleges and universities could make the assumption of computer literacy and then simply require the students to effectively use computers to complete their assignments without providing any instruction or assistance in computer use. It would be assumed that students would be able to use word processing, spreadsheet, database, presentation software, and Internet search capability the same way as using a pencil or a calculator or using the university library. Since fall 1999, the University of Dayton has required all first-year students to purchase a personal computer. The university also provides appropriate assessment, tutorials and certification software along with high speed networking (University of Dayton, 2003b). Students are expected to effectively use information technologies to find knowledge, evaluate and analyze information, demonstrate ethical use of information and technology and become a life-long learner of information technology (University of Dayton, 2003a).

In other states like the authors this would be a difficult assumption since there is no such performance requirement for high school graduates. We did not feel this was an appropriate approach since students have enough problems adapting to the college and university environment without inflated expectations on the use of technology.

Literacy Examination or Certification Required

Students must pass an examination or show certification in some or all of the following topics: knowledge of information technologies, basic operating system commands, file maintenance, word processing, spreadsheet, presentation software, e-mail, WWW, Internet, networking, and ability to search and locate information, analyze and evaluate the information, ethical and legal aspects of information (South, 2004; St., 2004; SUNY, 2004b). These requirements must usually be met during the first two years of university enrollment. The institutions in this category provide tutorials and non-credit instruction (Washington, 2004). They do not offer credit courses in computer literacy. This just-in-time (JIT) model may be the least costly and most flexible approach (Figueroa, 2000).

Students can identify their weaknesses by using a diagnostic or assessment examination. Self-paced tutorials are available to assist students in obtaining the necessary skills (Bhatnagar, 2001; James, 2004; St., 2004; SUNY, 2004a).

Required Computer Literacy Course

Our university has a required fundamentals of information systems course, without any test-out options, except for CLEP examination, based on the review this approach appears to be the most common practice. We have separated the knowledge of information technologies into a two credit hour lecture course and the software proficiencies into a one credit hour lab. Students who pass the lecture course but fail the lab would only have to retake the lab course. This approach is easy to schedule and it also generates a large number of student credit hours. The large number of student credit hours generated by the introductory course has been extremely helpful in the last few years with declining numbers of Computer Information Systems majors. We are still able to offer upper-division courses with small enrollments, since the enrollment in the introductory course has remained fairly constant.

From the student viewpoint this has a number of problems. The student must take both the lecture course and the lab course even if they possess some of the software skills or have some knowledge of information technologies. This approach also makes it difficult for the professor to meet the needs of the students. When one of the authors taught the fundamentals of information systems course, the student skills ranged from those with programming and Web development experience to those who had not touched a computer prior to taking the course. Some students were bored with the content, because they had some or a great deal of knowledge and others were lost. So the one-size-fits-all approach may leave both the students and the faculty teaching the course frustrated.

Computer Literacy Requirement with Course or Credit by Examination Options

These universities have a computer literacy requirement that can be met by either taking a course or courses in computer literacy or by obtaining a passing score on a proficiency examination (California, 2004; Columbus, 2004; Florida, 2004; University of Texas, 2004; Weber, 2004). The proficiency examinations can be created internally, an external vendor-neutral source (Miami, 2004; Tek.Xam, 2004a), or industry certification exams (West, 2004). An internally created examination would best meet the university and course objectives, however, faculty resources must be assigned to developing and maintaining the questions used on the examinations. Resources must also be applied to administering and reporting on the results of the examinations. It might be possible for the faculty who teach the computer literacy course or courses to take on the examination development, maintaining, and administering duties. They may also be able to use the same questions for the course examinations. By having the existing computer literacy take on the examination tasks it would reduce the resource requirements.

An important consideration in this alternative is what if any revenue the department receives from development, maintaining, and administering of the proficiency examinations? Is an examination fee charged for each time a student takes an examination? Are students required to register for a course with credit hours assigned to it until they complete the proficiency? If the university counseling and testing center administers the proficiency examination they would collect the testing fee and no credit hours would be earned by the college, thus reducing overall student credit hours.

5. RECOMMENDATIONS

The future fundamentals of information systems course needs to be innovative to meet the diverse needs of the incoming university student. In 1999 the National Academy of Sciences funded a report, *Being Fluent with Information Technology.* One of the major findings of this report was that "fluency with information technology requires three kinds of knowledge: contemporary skills, foundational concepts, and intellectual capabilities" (National, 1999). This finding is still appropriate today. Foundational concepts of information processing and intellectual capabilities have remained fairly constant, but the contemporary skills change rapidly. Incoming university students have some of the

contemporary skills in using a computer, but may lack a solid background in the concepts of information processing and use of their intellectual capabilities.

Redesigning of the course may require separating the course into modules for each major concept area. It would also be appropriate to provide credit-by-examination options with course credit for those students who already possess the necessary skills. For the contemporary skills we could also allow outside certification (Marquis, 2002). Several options are available for credit-by-exam or certification of computer skills. Several of the universities have developed their own test instruments and others are using tests created by outside organizations (ExpertRating, 2004; Tek.Xam, 2004b).

A locally created test could precisely match the learning objectives of each university's course. However, several versions of the examination would have to be created and exam questions would have to be updated on an annual basis to be kept current. Another problem with a local examination is the validity and reliability of the examination.

Computer capabilities, hardware and software functions, and office productivity software are generic. So why should each university reinvent the wheel, by creating a university-specific computer literacy assessment instrument?

By allowing or creating more modules and test out options we create a more complex course to manage and to staff. Funding is also a major consideration. Significant student credit hours are generated by a required introduction to computer courses. In many institutions these student credit hours are used to provide faculty resources for smaller upper division classes in computer and information technology. If these student credit hours were reduced or went away would we be able to offer a major in computer and information technology?

A proposed solution would be to offer required course modules for the following content: knowledge of information technologies, basic operating system commands, file maintenance, word processing, spreadsheet, presentation software, e-mail, WWW, Internet, networking, and ability to search and locate information, analyze and evaluate the information, ethical and legal aspects of information. Some of the content could be combined so that the number of course modules would not be completely unmanageable. Each course module would have an exit (proficiency) examination. The exit examinations can be obtained from external sources to provide for examination reliability and current information.

Students could take the exit examination any time during the semester they are enrolled in the course. Successful completion of the exit exam would result in a passing grade for that course module and an end to course attendance. This would allow us to verify that students possessed the required skills, maintain student credit hours, and to allow students more flexibility.

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