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Challenges for Curriculum Design in IT Education

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INTRODUCTION

Widespread applications of computer technology prompted the adoption of "Introduction to Computers" course in many college curriculums. Many business schools provided the computer literacy training through Information Systems curriculums. Growing popularity of the basic computing course created pressure in both computing facility and staffing support. The rapidly changing technology posted major challenges for designers of Information Systems (IS) curriculum. Careful decision must be made to select the appropriate technological platform, and to balance the technological capability with a shrinking budget. A greater challenge was to design IS courses for students who had no intention of pursuing the vigorous IS professional training. These students lacked the same motivation of those choosing a career in IS, and experienced great difficulties in adjusting to the pace of a traditional IS courses. At the same time, the course designer must consider the prior computing experiences of the students, and changing expectation of students, faculty, and other stakeholders. The huge discrepancy in technical backgrounds and career interests posted challenges in instructional delivery. The course designer must be selective in bundling relevant materials into the limited time of a single course, while providing sufficient challenge and learning experience relative to the prior technical backgrounds of students.

This paper reports research findings of an exploratory survey seeking answers to some of these questions. We originally planned to apply an identical survey instrument at both the University of Guam and at the Fairleigh Dickinson University, each campus with approximately 200 students enrollment for the "Introduction to Computers" course. However, only a portion of the data collected from the University of Guam was available prior to the proceeding publication. We expected a much larger sample size with updated results.

SURVEY INSTRUMENT

Students were asked to complete a questionnaire to indicate their experience with a list of fifteen areas of computing, communication and network technologies. The list was chosen to ensure common knowledge of the technologies, although it would be difficult to ensure a common definition among the respondents for each particular technology. The students were asked to indicate years of experience with each technology, and whether the technology was used at work. The respondents next answered whether they had easy access to technologies, and those they planned to own or subscribe to. They were then asked to indicate the importance of each technology in their career, and whether the technology should be a mandatory training in high school or college curriculum. Lastly, they were asked to express their feeling toward computing activities. The survey was designed for voluntary participation, and thus aimed at collecting exploratory data that could give better insight toward design of IT training.

PRELIMINARY SAMPLE DESCRIPTIONS

The survey was conducted among University of Guam students enrolling in IS courses. This ensured that the students had adequate understanding of the technical terminology, and a fresh experience with the usage of technology. Over ninety-five percent of the students participating in the survey did not pursue a career in IS, and over forty percent of the enrolled students were from outside the College of Business and Public Administration that offered the course. We chose to allow voluntary participation in the survey study with full disclosure under the human research subject guidelines, thus reducing the possibility of random responses or potential harm to the respondents. A usable sample of 85 responses was used to compile this preliminary report.

REEXAMINE THE OBJECTIVE OF AN "INTRODUCTION TO COMPUTERS" COURSE

As the first course in an Information Systems curriculum, the "Introduction to Computers" course was frequently designed to prepare students for more vigorous computer and technical training. As a result, the emphasis tends to be on the depth of knowledge on technical details, compared to the productivity deployment of computers in general applications. This strategy began to fail with multiple platforms of technology, and especially when students enrolled in the course had diverse career interests. Many students must be motivated to learn computing, as a mandatory requirement rather than a study of personal choice. Other students might have a preference for a technology platform other than the selected platform, and some might have advanced beyond introductory computing concepts. There was also increasing pressure to ensure that students acquire computing capability besides a basic conceptual understanding of computing.

Table 1 summarized the voting results on the array of technology that should be adopted as mandatory training. Over half of the respondents believed that a broad spectrum of technical training should be required for students either at high school or at the college level. A majority of them believed that word processing, spreadsheet, Internet, email and chat room should be required in a high school program. Twenty percent agreed that college level training would be desirable in these areas. This immediately raised the research question whether colleges should use their limited resources to provide training in these areas. A relevant question to ask is whether students would have acquired the adequate levels of skills at the high school level. An informal survey among IS instructors concluded that students were not sufficiently prepared to handle tasks requiring these skills at the college level. Future research should provide more insight for IS curriculum designers.

The unexpected findings were the large ratio of respondents expecting college training in programming, web design, groupware, networking, database, PCS, and high-end application software such as CAD/CAM and Desktop Publishing. The findings were significant especially for the fact that a majority of the respondents did not choose a program of study in Computer Science (CS), Computer Information System (CIS), or Information Systems. At the University of Guam, the Computer Science department offers a separate "Introduction to Computers" course for CS and CIS students. Further research should investigate the real interests of the general body of students, and how non-professional track technical training could benefit them.

DESIRABLE OUTCOMES FOR COMPUTER TRAINING

Course contents in a curriculum were normally packaged to support outcomes of specific degree programs, designed by IS faculty. However, there

Table 1: Perceived Required Technology Training

Perceived Required Training	During High School	In College
Word Processing	91%	18%
Programming	25%	66%
Electronic Presentation	61%	42%
Internet	88%	20%
Web design	39%	58%
Groupware	28%	54%
e-mail	88%	18%
LAN	24%	64%
Network Administration	15%	74%
Spreadsheet	75%	32%
CAD/CAM	24%	64%
Desktop Publishing	28%	61%
Chat room	72%	19%
Database	35%	54%
PCS	27%	56%

could be a mismatch between the intended outcomes of an individual course, compared to the desired outcomes of individual students, as increasing number of students outside of the academic program enrolled in the course. Table 2 showed the perceived importance of various technical skills. It was interesting to observe that, with the exception of programming and web-design, respondents did not expect to receive college training for technical skills considered important to their career. It was also interesting to observe that many technical training considered mandatory requirements at college level were not considered important to the career of the respondents. The important research question to ask would be whether students consider technical training as important enrichment experience for their career development, or that students were not aware of the growing importance of technology in the various career paths. Additional research should help to make technical training more assessable; to debate the role of IT training as foundation skills, similar to language and mathematics; and for improving the IT awareness of career counselors.

PRIOR EXPERIENCE WITH TECHNOLOGY

With the prevalence of technology, students were expected to receive early exposure to information technology during their high school years. Students were asked to indicate the years of experience they had with the use of each technology, and whether the technology was used at work. Table 3 summarized the results. The low ratio of those with more than 5 years of experience with various technologies indicated the slow progress in exposing students to technology at their early age. It is hope that the ratio would improve with subsequent research studies. Most of the respondents did not receive an early exposure to areas of technology with significant applications. These areas include electronic presentation, spreadsheet, and database. The low awareness of web-based technology signaled a potential gap in preparing the future workforce for electronic business environment. Less than 25% of the respondent reported experience with PCS technology, while 86% of them reported easy access to cellular telephones. The knowledge gap was disturbing given the trend toward a full digital environment.

Table 2: Skills Important for Career

Technical Skill	Considered important for career	Required College Training
Word Processing	91%	18%
Programming	52%	66%
Electronic Presentation	72%	42%
Internet	79%	20%
Web design	51%	58%
Groupware	28%	54%
e-mail	78%	18%
LAN	25%	64%
Network Administration	42%	74%
Spreadsheet	84%	32%
CAD/CAM	27%	64%
Desktop Publishing	46%	61%
Chat room	25%	19%
Database	49%	54%
PCS	34%	56%
Graphics	60%	n/a

Table 3: Prior Experience with Technologies

Technology	With some experience	More than 1 year experience	More than 5 years experience	Use at work
Word Processing	94%	82%	51%	36%
Programming	31%	12%	2%	5%
Electronic Presentation	59%	35%	7%	14%
Internet	92%	86%	54%	27%
Web design	25%	11%	2%	1%
Groupware	14%	4%	2%	4%
e-mail	92%	85%	53%	31%
LAN	26%	15%	5%	7%
Network Administration	21%	8%	4%	7%
Spreadsheet	72%	51%	22%	27%
CAD/CAM	14%	5%	2%	0%
Desktop Publishing	16%	9%	6%	5%
Chat room	68%	52%	20%	6%
Database	32%	18%	7%	9%
PCS	24%	13%	4%	7%
Graphics	38%	18%	7%	11%
Communications	55%	39%	20%	15%

EQUIPMENT SUPPORT FOR IT EDUCATION

For many years, IT education had been hampered by the limited training facility and equipment. Ninety-four percentage of the respondents claimed easy access to personal computer and Internet, and 67% of them reported easy access to cable TV network and fax machine. Sixty-five percent of this group planned to own a personal computer and subscribe to Internet service. This prompted the research question of whether IT curriculum should be planned around the limited resources of educational institutions. Innovative design practices could take advantage of the accessibility of technology resources to students for more flexible instructional programs at greatly reduced infrastructure supporting costs.

CONCLUSION

A closing question asked the respondents to rate statements on a five points scale, with 1 represent strongly agree, 3 for neutral, and 5 for strongly disagree. The average response was 3.9 to the statement "Working with computers is so complicated it is difficult to understand what is going on", with a standard deviation of 0.9. Despite the small sample size, this was beginning evidence of a new generation that would incline to embrace the complexity of technology. The expressed desired for advanced IT training, and the readiness of students to ensure availability of computing resources suggested the need to revise model for the planning and delivery of IT education. The expanded data collection would improve our understanding of the observed challenges for IT curriculum design. Our goal would be to compare student preparedness, geographic environment, and other educational factors for the adjustment of IT curriculum design for global delivery.

REFERENCES

Available on Request.