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ABSTRACT

This paper reports on the results of a preliminary investigation of the extent to which first-year students entering a university during the summer, who enroll in the introductory information systems course in a college of business, meet the requirements for the course upon entrance. A second objective is to recommend a course of action to be taken in regard to the continuance or discontinuance of the introductory information systems course. A justification for the study is that more and more students are being exposed to computers and computing in scholastic settings and as a result find the introductory course repetitive and tedious. In addition, students are acquiring their own computers in rapidly growing numbers and, because of their personal use of applications such as Microsoft Office, are sufficiently knowledgeable to move on to more advanced courses. Finally, the need for computer usage in college is vital especially in light of the fact the 45% of college students in the Northeast report they use computers regularly. The study used a pretest to measure student knowledge of general theoretical computer concepts and applications. It is concluded that, until further research is done, the introductory computer information systems course should remain a required part of the business college curriculum. (MES)

Should the Introductory Information Systems Course Be Removed From the Business School Curriculum? A Preliminary Investigation

By:

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SHOULD THE INTRODUCTORY INFORMATION SYSTEMS COURSE BE REMOVED FROM THE BUSINESS SCHOOL CURRICULUM? A PRELIMINARY INVESTIGATION

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The purpose of this paper is to present a report on the results of a preliminary investigation of the extent to which first-year students entering a university during the summer, who enroll in the summer Introductory Information Systems Course in a College of Business, meet the requirements for the course upon entrance. A second objective is to recommend a course of action to be taken in regard to the continuance or discontinuance of the Introductory Information Systems Course. A justification for the study is that recently, there has been discussion on the possibility of removing the introductory course as a requirement for business students. The argument on the one hand is that more and more students are being exposed to computers and computing in scholastic settings and as a result find the introductory course not only repetitive but also most tedious. In addition, students are acquiring their own computers in rapidly growing numbers and because of their personal use of applications such as Microsoft Office are sufficiently knowledgeable to move on to IS 97. 2[1]. Finally, the need for computer usage in college is vital especially in light of the fact that 45% of college students in the Northeast report they use computers regularly. (Kate)

INTRODUCTION

In approaching the study several questions beg to be addressed:

- Do scholastic computer literacy/competency courses cover IS'97. 1 topics or are they more concerned with the prerequisite for that course, the IS'97 PO which is a "Knowledge Work Software Toolkit?"
- When we say students come to the university with the requisite skills are we talking about the Fundamentals of IS addressed in IS'97?
- Can a paper and pencil test capture skills a student has in using and understanding applications software?
- Is it necessary or appropriate that all College of Business majors take IS'97. 1?

These questions are worthy of in-depth investigation on their own merit but cannot be fully addressed in this study which is limited to that raised in the title. This is just a beginning. As other educators raise questions such as addressed by this study they will need a cache of solid information on which to base their decisions in an intelligent fashion. The authors of this study intend to follow-up on these and other related questions as they may arise in future.

REVIEW OF LITERATURE

There does not appear to be much significant research based upon the concerns of this study. One somewhat related study, conducted in Israel (Koslosky et. al), examined the influence of previous experience on the computer activity of first-year university students. One result observed was that when computer activity was tracked by experience, differences in behavior patterns

and magnitude showed some difference. Subjects with low-experience spent more time on computers than high-experience cohorts did. As a result students should be taught according to ability levels. Another study (Bianco) that is most relevant, was designed to answer the question of whether there is still a need for the basic computer literacy course in college. In that study, a questionnaire was sent out to the computer departments of all 501 school districts in the state of Pennsylvania. The purpose of the questionnaire was to find out exactly what computer courses if any were offered at the various schools. In this way, the extent to which students are exposed to computer education in scholastic settings was determined. One result of that study was that students enrolling in the university where the researchers teach, are likely to have "basic computer understandings, knowledge, and hands-on experiences in popular software applications." While the authors of this study would support those findings, they do believe that there is no question but that there may be a significant difference between what is offered in classrooms and what is actually learned and/or carried forward to other learning situations. For example (Seebach) concluded, "about 30 percent of incoming freshmen nationally, are graduating from high school in June and signing up for high-school courses in September". Furthermore, it has been shown that even though students may be given large incentives to use computers over 25% at a university did not take advantage of it in one case study. (Zagorsky)

Still another study (Partee) led the author to suggest that implementing computer-based techniques into the college classroom is hampered because of "inadequate preparation in high schools (caused primarily by limited funding) which leaves many college students computer illiterate". In a study of college students and computers, (Brown/Kester) found that in 1993 "students had studied all sorts of programs in their previous schooling but had forgotten most of them", by the time they arrived in college. In a study of college students and computers Brown and Kester observed that "The computer skills that students learned in high school and early in college did not appear to carry over into their senior year in college". That observation, it must be pointed out, was due to the fact that the students did not use the skills after they learned them. Nevertheless, a study out of Texas Tech University (Geissier/Horridge) concludes "that having taken a high school or university computer class or owning a computer strongly influences a student's self-perceived level of current knowledge about computers and the student's commitment to learning more about them". Catholic University of America has a special program to introduce high school students to science and technology (Chin). Through this program participating schools are provided with computing and networking capabilities. Some 32 States have developed K-12 educational standards and curriculum frameworks for technology (ITEA) which ought to contribute greatly to pre-college computer preparation. Much of the literature fails to address what students know about and are able to do with computers. Even articles on the history of computers in education (Molnar) skip the subject of what and how much students in scholastic settings learn about computers. There is, however, strong evidence that more is being done in the area than ever before. (Plotnick) for example shows that "Computers are pervasive in schools and higher education institutions". Computer literacy is a very popular topic in the literature (Choo) (Smith) (Clements/Carifio) (Amini) as are studies of gender differences as they affect computer learning (Shashaani) and student attitudes about computer use (Larson/Smith), (Geisser/Horridge) (Hannafin/Cole) (Gholamreza/ Xenophon).

Some studies (Babcock) call for more articulation between High Schools and Colleges and Universities with an eye towards developing new computer education curricula. As far back as 1993 (Woodhouse) also studied the objectives of introductory computer courses. That study was more concerned, however, with structured programming and programming languages.

One study (Bianco) supported the establishment of a testing mechanism to be administered as a part of the Scholastic Aptitude Test (SAT) or otherwise to determine whether students should be exempted from the introductory college course. The DANTES test currently being normed through the Educational Testing Service (ETS) may be an answer. In this regard also, an instructive solution is the recommendation, mentioned earlier, in (Koslowsky et.al.) that there "...is the need to tailor beginning computer courses to the students' backgrounds".

Perhaps there are also solutions to the problem of what students learn and remember such as possible in the redesigning of introductory computer courses even as suggested by Woodhouse.

RESEARCH DESIGN AND METHODOLOGY

Subjects

The subjects for this study form a unique self-selected group that may be said to have been placed there by accidental assignment. The subjects were incoming fresh-

persons more often referred to as 'summer freshmen'. These students are regular admits to the university who have the opportunity to take twelve or fewer credits in the summer and enter the mainstream either in the Fall or the following Spring depending upon summer grade-point average and available seats. The subjects were those who indicated an interest in a major in the College of Business and were enrolled in the course, Introduction to Computer Information Systems. Data were collected on 16 subjects who were present for the first class session. It was expected that there would have been 25 subjects.

Measures

A test instrument, developed in-house, was designed to measure the extent to which the incoming fresh-persons can answer multiple-choice questions on general theoretical computer concepts and applications. The test was prepared from the vendor supplied Test-Bank available with the textbook currently used in the introductory course. Faculty members have examined the test and agree that in large measure it is equivalent to the kind of examination they might give as a comprehensive final examination. The instrument consisted of 100 multiple-choice items from all 13 chapters of the text.[2]

Limitations

As stated above, the subjects for this study were placed by accidental assignment. While this is not the best of design methods the subjects were readily available and it is appropriate for the action research objective of the study. Caution, however, should accompany any attempt to generalize the findings to other populations and such attempts must be made with due regard for the limitations of this study. It is important to note also that the sample studied was small and that the test instrument had not been subjected to tests of validity and/or reliability.

Hypothesis

This study may be considered to be within the class of experiments known as Action Research. In this regard the study is undertaken for an on-the-job application of the results by the investigators and the improvement of the curriculum at a particular institution. The results are by no means less valuable as a starting point for others at similar institutions. The major hypothesis is of the hypothesis-prediction type and is stated as follows:

> Incoming summer fresh-persons who have completed significant computer competency training in a scholastic setting will demonstrate mastery of the content of the College of Business IS introductory course with at least a 70% score as measured by an in-house test deemed suitable for use as a final examination.

The authors' operational definition of significant is at least one school year of experience in a computer literacy/competency course.

Procedures

On the first day of classes for the nine-week summer session students filled out the short questionnaire and answered the questions on the test instrument used as a pre-test. The data collected from these activities were preserved with the use of randomly assigned student identification numbers and the link to actual names destroyed.

Results

Simple percentages were used to show that 12.5% of the subjects reported that they had no computer course in high school. There were 18.75% who had one course, and 68.75% had 2 or more courses in high school. The average score on the test instrument for subjects with no high school courses in computers was 34.00 out of 100. For those with one course the average was 44.00 and for those with 2 or more courses the average was 41.27.

Of those subjects who had computer courses in high school 68.5% covered basic concepts, and 37.5% covered networking topics, while 50% also covered multimedia and 43.75% had studied programming.

Subjects who used one or more word processors were represented at almost 90% while one quarter had used one or more databases. Nearly 40% had used one or more spreadsheet programs.

The subjects reported that 50% had used Windows 3.1 as an operating system and 68.75 had used Windows 95. (See Table 1)

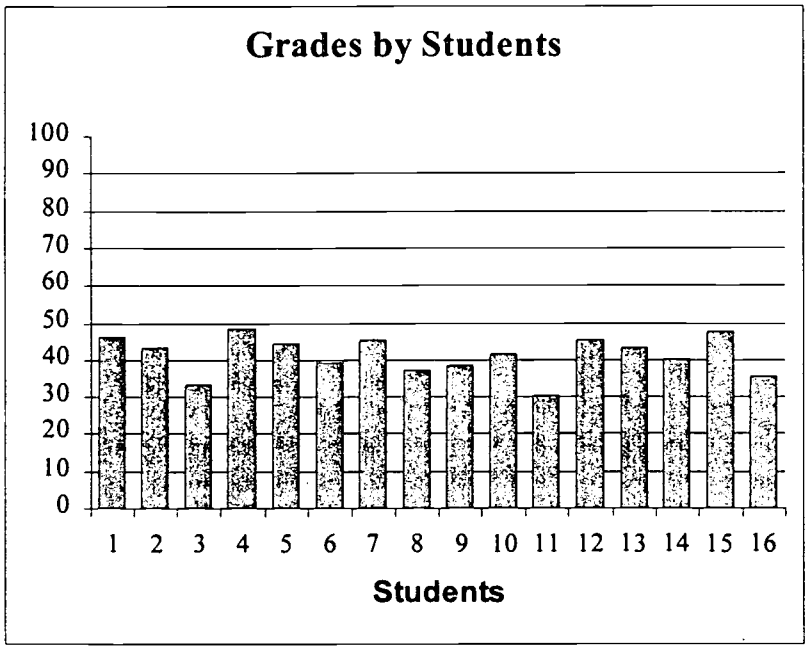
TABLE 1
PRIOR EXPOSURE TO COMPUTER INSTRUCTION

COURSES TAKEN	%	GRADE	TOPICS COVERED	%	SOFTWARE Apps.	%	OPERATING Sys.	%
None	12.5	34.0	Basic Concepts	68.8	Word-Processing	87.5	WINDOWS 95	68.8
One	18.8	44.0	Networks	37.5	Database	25.0	Windows 3.1	50.0
Two or more	68.8	41.3	Multimedia	50.0	Spreadsheet	37.5	Other	0.0
			Programming	43.8				

The mean score on the pre-test was 40.9% with a range from 30 to 48. (See TABLE 2) So that none of the subjects scored at or above the 70% level expected by hypothesis. The hypothesis then is rejected.

FIGURE 1
INDIVIDUAL GRADE RESULTS ON PRE-TEST

GRADE
46
43
33
48
44
39
45
37
38
41
30
45
43
40
47
35



An interesting result is contained in an analysis of the grades students received on the pre-test based on chapters from the text. (See Figure 2) The 70% level was achieved on chapter 7 which covered Word-processing and Desktop Publishing while concerning chapter 8 (Spreadsheet and Database Applications) and chapter 9 (Communications-The Electronic Web), the score was slightly above 60%. The rest of the 13 chapters all falling at or below 50% show that there is a need in the areas of Hardware, Software, Programming etc.

FIGURE 2
GRADE RESULTS ON PRE-TEST BY CHAPTER

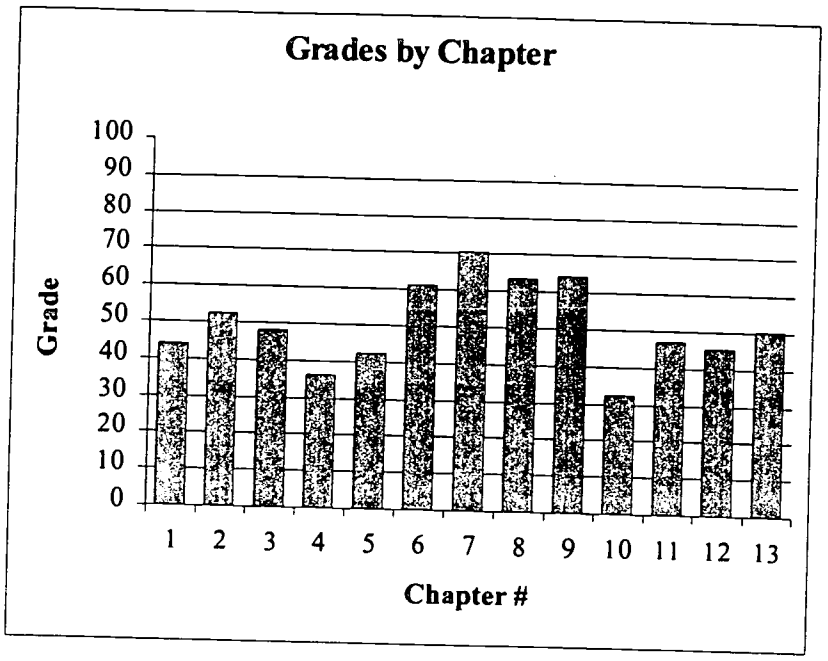


TABLE 2
SUMMARY OF GRADES AND QUESTION DIFFICULTY

	TOTAL		
	Easy	Medium	Hard
Student	*20*	*54*	*26*
1	75.00%	40.74%	34.62%
2	45.00%	44.44%	38.46%
3	50.00%	25.93%	34.62%
4	65.00%	42.59%	46.15%
5	60.00%	40.74%	38.46%
6	45.00%	35.19%	42.31%
7	80.00%	38.89%	30.77%
8	40.00%	42.59%	23.08%
9	45.00%	33.33%	42.31%
10	65.00%	35.19%	34.62%
11	60.00%	20.37%	26.92%
12	65.00%	42.59%	34.62%
13	70.00%	37.04%	34.62%
14	55.00%	35.19%	38.46%
15	60.00%	50.00%	30.77%
16	55.00%	27.78%	34.62%

TABLE 3
SUMMARY STATISTICS

	Total grade
Mean	40.875
Standard Error	1.306633716
Median	42
Mode	43
Standard Deviation	5.226534862
Sample Variance	27.31666667
Kurtosis	-0.408085553
Skewness	-0.613867968
Range	18
Minimum	30
Maximum	48
Sum	654
Count	16

Concerning the difficulty of test questions, as may be expected, subjects did a lot better on question deemed easy than they did on those of medium difficulty and in turn, better on the medium than on the hard. For student 3 both the easy and hard questions were answered at a higher level than the medium. A similar result was se4en also for students 4, 9, 11, 14, and 16.

CONCLUSIONS AND RECOMMENDATIONS

Based upon the rejection of the hypothesis, the authors conclude that until further research is done the Introductory Computer Information Systems Course should remain a required part of the Business College curriculum. A carefully constructed test of the computer abilities of high school students needs to be established, as the instrument used in this study did not provide a high degree of confidence. Prior to the development of the test some understanding must be reached among high school, college, and university computer educators as to what students should know or be able to accomplish with computers. Then the textbook publishers, curriculum specialists, test bank designers and others must work together to ensure outcomes that allow the high school graduate to have full computer competency. The literature shows that there is movement towards both of these criteria and especially in regard to the latter on the state level. Based on this study, students appear to be getting exposed to application suites such as Microsoft Office. Whether that is sufficient for computer literacy or competency remains to be seen and begs for investigation, The authors can remember when there was a burst of enthusiasm in educational circles for abolishment of freshman English and algebra from the college curriculum since so much is offered in the fundamentals of those subjects at the scholastic level. This idea has not been borne out in reality and it is suspected that the same will be true of freshman computer courses.

It is recommended that this study be replicated in a number of different settings with standardized test instruments and topic commensurate with what is taught in schools. The questions raised at the front-end of this report remain compelling and should be addressed. Perhaps a team such as that which designed the IS'97 model curriculum should be assembled to bridge the curriculum gap between high school and college establish a pre-college model curriculum,

ENDNOTES

1. IS '97 is the Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems. This curriculum was developed as a collaborative efort of the Association for Computing Machinery, the Association for Information Systems, and the Assoication of Information Technology Professionals. The course IS '97. 1 refers to the first course in the sequence of courses under this model curriculum.
2. Curtin, C., et al., Information Techology: The Breaking Wave. McGraw-Hill, 1998.

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