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Integrating the Microcomputer Into Managerial Accounting Classes: An Experimental Study

By Michael Y. Hu and Gary Saunders

Release of the report "A Nation at Risk," by a presidential commission, refocused attention on the nation's educational system. Not unexpectedly, a myriad of suggestions for improvement followed the release. An increased role for computers in the educational process was one of the oft repeated suggestions. However, the Secretary of Education, among others, has cautioned that the computer is not a panacea.

The microcomputer represents a new plateau in computer technology as an extremely powerful instrument which can be acquired at a modest cost and can be made user-friendly. Also, the popularity of microcomputers will continue to grow both in the home and the classroom. Microcomputers present, however, a unique challenge to the academic community; i.e., how to best assimilate them into the learning process.

Ijiri [1983, p. 171] points out that one major problem accounting academicians must overcome, both from a teaching and from students' learning perspective, is the sudden switch in the mode of thinking. Learning accounting concepts utilizing microcomputers requires a distinctly

different approach from learning these concepts through traditional methods. Thorough development of a microcomputer approach to learning will require sustained effort from accounting academicians. Alternative methods of integrating the microcomputer must be compared with traditional teaching methods to determine if the learning process is perceptibly improved. This paper reports the results of one such comparison.

Two major research questions were addressed in the study. First, will the use of microcomputer modules, relating to cost-volume-profit (CVP) analysis and operational budgeting, improve the learning process in managerial accounting classes? Second, will students react favorably to the use of microcomputer modules in managerial accounting?

The Modules

Microcomputer modules were developed for CVP analysis and for operational budgeting. Both modules recorded each student's name and the time they spent working with the module to a file. The CVP module began with a tutorial session which presented a derivation of the common forms of the CVP equation. Students

were offered a choice of repeating the tutorial or proceeding to the problem-solving portion.

In the problem-solving portion of the CVP module, students were given instructions for entering the information contained in a problem assignment. The module is capable of calculating any of the components in the CVP equations with the exception of contribution margin and contribution margin ratio. After data are entered, the module plots a graph of the cost and revenue functions, prints the form of the CVP equation used, the value of the requested variable and the breakeven point. Students then copy the results onto the problem assignment sheet to be handed in.

The operating budgeting module was developed to generate budgets through the budgeted balance sheet. For use in the managerial accounting classes, however, portions of the module were disabled so that only sales, production and material purchases budgets were available to the student. As this module did not contain a tutorial section, students proceeded directly into the data entering stage. A number of options were presented with regard to factors such as the method of projecting ending inventories, percentage of receivables collected in a period and percentage of purchases paid for in a period. As with the CVP module, the time spent with the module was recorded and students were required to hand in the assignments.

Design

The study was conducted with managerial accounting students at the Kent State University. Computer modules used in the study were developed only shortly before the onset of the experiment. No similar computer exercise/homework had been used in any accounting courses that the students would have taken previously. It can be safely assumed, therefore, that this was the first exposure to the use of microcomputers in accounting courses for students participating in the study.

Four managerial accounting principles classes of approximately equal size totalling 96 students, were contained in the study. The four classes were taught by two instructors, each having two sections. A layout of the design is shown in Figure 1.

In order to balance the possible effect of different instructors on the results of this study, a restricted form of random assignment of treatments was used. One of the two sections taught by an instructor was given a problem to be solved using the CVP computer module, while the other section was taught by the traditional method. Later in the course the assignment of treatments was reversed; the operational budgeting module was used in the class which was taught CVP by the traditional method and the CVP module was used in the class that was taught operational budgeting by the traditional method. In essence, students in each class were assigned one but not both of the computer exercises.

FIGURE 1
Layout Of Design

	CVP	Budgeting
Instructor I		
Section 1	E	C
Section 2	C	E
Instructor II		
Section 1	E	C
Section 2	C	E

E = Experimental, Computer Module
C = Control, Traditional Method

From an experimental design perspective, the treatments were balanced with respect to instructor variation. Both the experimental and control groups for CVP were taught by the same two instructors. The identical concept was extended to the budgeting situation.

Measurement Instruments

Three sets of measurements were taken in the study. First, two separate problems, one on CVP and the other on budgeting, were included in a midterm examination given on the same day for all four classes. In order to ensure consistency in grading, the two problems were graded by a single graduate assistant specifically instructed for the study. Each problem was graded on a scale of zero to 100 possible points allowing partial credit where appropriate. Test scores provided a measure of the relative amount of learning that had taken place, with respect to the experimental and control groups, for the two topics contained in the study.

The total amount of time each student spent on the microcomputer was logged. Time spent was considered a

potential explanatory variable in accounting for variation in the test scores.

To measure students' general reactions toward the use of personal computers in accounting courses a set of attitudinal measurements were obtained in a questionnaire survey conducted at the end of the semester. Students were asked to respond to a six-point rating scale, strongly agree to strongly disagree, for each of the five following statements.

1. Working with the IBM PC was an enjoyable experience.
2. Working with the IBM PC enhanced my learning of the course material.
3. Use of personal computers should be continued in future managerial accounting courses.
4. Usage of personal computers should be incorporated in other accounting courses.
5. My attitude towards computers has been measurably changed by this experience with the personal computer.

While the two test scores were related specifically to the treatment variables, the survey questionnaire was designed to measure general attitudes toward the microcomputer and its use in accounting courses.

Results

Correlation analysis was used to detect any relationship between the amount of time each student spent on the computer with CVP or operational budgeting and his/her respective test scores. Results indicated that the two sets of variables were not statistically correlated (at the 0.05 level). For CVP test scores and the amounts of computer time, the correlation coefficient was -0.041 (with a p - value of 0.729). For budgeting, the coefficient was -0.049 (p - value = 0.739). Since the amount of computer time did not help to reduce the variation in the test score, it was excluded from further analysis.

One objective of the study was to examine whether the utilization of personal computer modules in accounting actually enhances learning. Results related to this objective are shown in Table 1. For the experimental group of 48 students who had used the CVP module, the average test score was 82.19 with a standard deviation of 4.42. For the control group, the

average was 78.85 (standard deviation = 4.56). The two independent sample t-tests, designed to detect significant differences in the average between these two groups, yielded a p - value of 0.601. Similar results were found for the budgeting module. The averages were 59.00 (standard deviation = 5.92) and 52.27 (standard deviation = 5.90) for the experimental and control groups respectively, with a p - value of 0.423. It should be pointed out that the figures for standard deviation between the experimental and control groups for each computer module were very similar. This is an indication that the control groups were well constructed.

TABLE 1
Average Examination Scores

	Computer Traditional		
	n = 48	n = 48	p-Value
CVP	82.19 (4.42)	78.85 (4.56)	0.601
Budgeting	59.00 (5.92)	52.27 (5.90)	0.423

() = standard deviation

Though the differences in the averages were not statistically significant, the results contain interesting implications. For both CVP and budgeting, averages of the experimental groups were higher than those of the control. Replication of this study with a larger sample size would probably provide statistically significant differences showing that the computer modules are effective in raising the test scores.

Results from the attitude survey, given in Table 2, indicated that participants in the study expressed very positive attitudes towards the use of computer modules.

Most encouraging was the indication that students found their experience on microcomputers to be enjoyable. More importantly, they have concluded their learning of the course material was enhanced by the computer experience. Future application of personal computers in accounting courses was viewed even more positively by the participants of the study. The above, combined with the results given for the last statement, "My attitude towards computers has been measurably changed by this experience with the personal computer," suggests that the implementation of the microcomputer modules in the

managerial accounting course was successful.

Results further suggest that:

1. Many students who were quite apprehensive towards the computer at the beginning of the semester had their attitudes favorably altered.
2. Experience from this computer exercise was viewed to be very beneficial; and
3. Students in general were eager to spend more time on the microcomputer partly because it was an enjoyable experience and partly due to the fact that they believed they had learned more about the course material through this method of teaching.

Summary

Use of the computer modules in managerial accounting resulted in improved test scores. Those students who completed an assignment on the microcomputer learned the material better than those who did not use the microcomputer. The authors believe that the lack of statistical significance for the differences in average scores is due, in part, to the sample size and that an increase in sample size will result in a significant difference in scores. The fact that scores for the computer groups were consistently higher supports the premise that microcomputer usage enhanced learning.

The positive students' attitudes toward the use of microcomputer modules in the classes are encouraging. Even if the differences in test scores continue to not be significantly different, students' attitudes suggest that this attempt to integrate the microcomputer into managerial accounting classes was a success and that use of the modules should be continued.Ω

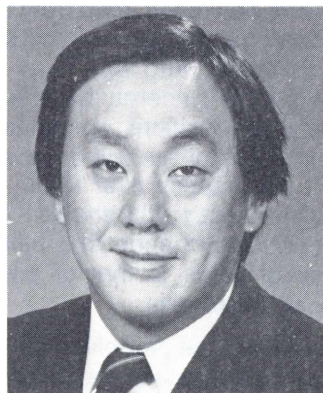
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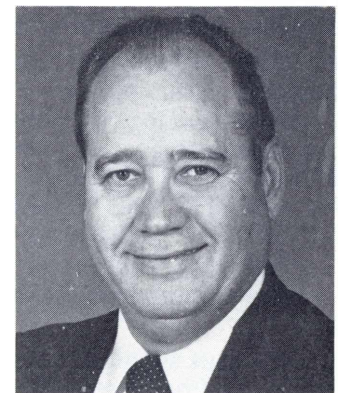
TABLE 2
ATTITUDE SURVEY RESULTS*
(Percent of Respondents)

	Strongly Disagree	Slightly Disagree	Slightly Agree	Strongly Agree
1. Working with the IBM PC was an enjoyable experience.	4	6	10	15
2. Working with the IBM PC enhanced my learning of the course material.	13	13	16	19
3. Use of personal computers should be continued in future managerial accounting courses.	4	5	4	13
4. Usage of personal computers should be incorporated in other accounting courses.	3	5	6	13
5. My attitude towards computers has been measurably changed by this experience with the personal computer.	8	13	14	19

*Percentages in Table 2 are rounded and, therefore, may not sum to 100.



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