

# Developments In Business Simulation & Experiential Exercises, Volume 17, 1990

## COMPUTER-AIDED EXERCISES VERSUS WORKBOOK EXERCISES AS LEARNING FACILITATOR IN THE PRINCIPLES OF MARKETING COURSE

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### ABSTRACT

Principles-level textbooks often are accompanied by a host of pedagogical devices provided by publishers to their adopter. Almost no assistance is provided with respect to which device is most effective. This paper describes an experiment in which a computer-aided approach is compared to a workbook exercise approach with respect to facilitating learning across various levels in Bloom's taxonomy (1956). It is found that the computer-aided alternative effects greater application learning, while the workbook exercise does not, gain learning beyond that acquired by textbook reading and normal classroom exposure. Both experiential pedagogies, however, are associated with more positive student attitudes. The authors recommend dissection of learning effects and consideration of the richness of the experience base when instructors or researchers ponder selection from among alternative pedagogical approaches.

### INTRODUCTION

Probably at no other course level is the number of pedagogical alternatives greater than with the principles course. Regardless of the business discipline involved, a mind-boggling array of instructional aids is commonly provided with the "instructor's package which accompanies adoption of a principles textbook. To some extent, this abundance reflects publishers' attempts to court potential adopters by creating a wide range of instructional aids to accommodate their diverse pedagogical preferences. In another sense, the several options merely illustrate that most concepts taught in the principles course are amenable to a variety of pedagogical approaches.

In any case, the instructor's packages typically include: computer-aided teaching modules, workbook experiential exercises, video tapes, case studies of varying lengths, readings, and end-of-chapter questions. While general suggestions for their various uses are sometimes provided, the instructor is left with his/her own judgement as to their precise application. Although no studies in the authors' knowledge exist on this problem, it would seem that confusion and uncertainty probably abound in this area. This claim can be verified from at least three perspectives. First, it is not unusual to find two or more pedagogical options covering the same concept(s), so the question of redundancy is raised. Second, there is insufficient time in a semester (or quarter) to use all of them, so the question of efficient use of time is apparent. Finally, publishers and authors do not differentiate the relative efficacy of the various options, so the question of effectiveness is also relevant in the selection decision.

These observations give rise to the central purpose of this paper. Specifically, it focuses on a principles course where instructor packages with several pedagogical options such as

those just described are provided to the adopters of the textbook. Within this context, the paper describes a study in which two alternatives, which provided with a popularly adopted principle of marketing textbook, are compared with respect to effectiveness. The study addresses learning effects as well as attitudinal consequences of using either pedagogy compared to a control group.

### BACKGROUND AND HYPOTHESES

A number of studies has addressed in a variety of ways the learning effects of alternative pedagogies. Unfortunately, most have not employed rigorous experimental designs (Kulik, Kulik and Cohen, 1980). While a few studies have provided support that learning effects of more "involving" pedagogies are greater than straight lecture or other low involving alternatives, the preponderance of rigorous evidence does not lend strong support for the claim of greater learning effects. Miles, Biggs and Schubert (1987) echo this conclusion. On the other hand, experiential pedagogies have been credited for some time to engender more positive student attitudes. This belief has been championed by Greenblat (1973), and it has been exhibited in a number of cases. For instance, see Burns and Sherrell, 1982; Dekkers and Donatti, 1981; Hemmasi, Graf and Kellogg, 1987; or Pierfy, 1977.

There are two criticisms of prior research, which guided the present study. Both criticisms pertain to simplistic measures of the dependent variable(s). First, learning is often measured by the use of simple objective tests, which evaluate the amount of content gleaned by students under various pedagogical environments. Typically such treatments fail to tap the complexity of learning effects, and some authors such as Butler, Markulis and Strang (1985) have argued that researchers should adopt a learning effects model which embodies the different conceivable levels of learning. In this paper, the authors have adopted Bloom's (1956) taxonomy of learning outcomes. This taxonomy has been thoroughly described in the literature (Bloom, 1956), and is presented in Figure 1. Essentially, Bloom (1956) argues that learning occurs along subsequent levels, beginning with the most basic (basic knowledge) and progressing to higher order thinking such as synthesis or evaluation. In other words, learning is a stair-step process with the learner progressing from one level to the next in systematic fashion. It is our contention that the ultimate level of attainment can be influenced in large part by the pedagogy used. That is, some pedagogies (e.g., one-way delivery) concentrate learning on the basic knowledge level, while others (e.g., provocative questioning) move the learner into the comprehension level, and still others (e.g., simulation gaming) may greatly facilitate higher-order learning such as analysis.

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FIGURE 1  
BLOOM'S TAXONOMY\*

Learning Level	Description
1. Basic Knowledge	Student recalls or recognizes information.
2. Comprehension	Students changes information into a different symbolic form.
3. Application	Student discovers relationships, generalizations and skills.
4. Analysis	Student solves problems in light of conscious knowledge of the relationship between components and the principle that organizes them.
5. Objective Synthesis	Student goes beyond what is known, providing new insights.
6. Objective Evaluation	Student develops the ability to create standards of judgment, to weigh and to analyze.

\* Adapted from Bloom (1956)

With respect to attitude effects, it is widely acknowledged that attitude is a multidimensional construct, and while no universal attitude model concerned with the effects of pedagogy has been developed, at least one study (Burns and Sherrell, 1982) has empirically refined Greenblat's (1971) original propositions concerning attitudinal effects. Burns and Sherrell (1982) identified five dimensions associated with experiential pedagogies; these dimensions were (1) perceived knowledge gained; (2) degree of enjoyment with the learning experience; (3) perceived benefits gained from the experience; (4) student-teacher relations; and (5) enhanced decision skills which students believed they had gained. In general, experiential pedagogies were associated with more positive overall attitude as well as more positive individual attitude dimensions.

These observations and criticisms have led to the study's hypotheses, which are cast in general terms:

H1: (Experiential Learning Hypothesis) Experiential pedagogies will effect greater overall learning than will nonexperiential pedagogies.

The rationale for this hypothesis should be fairly obvious as it embodies a fundamental hope of many experiential pedagogy users. In this study, nonexperiential pedagogies" pertains to one-way delivery such as lecture, textbook reading, or any other approach, which does not have an experiential basis.

H2: (Learning Level Hypothesis) An pedagogy which addresses a higher level of learning will be more effective at that level than one which addresses a lower level of learning; if both address the same (e.g., lower) level, learning will be identical on that level.

This hypothesis proposes that an experiential. pedagogy be analyzed with respect to the learning level it most embodies.

In other words, if it embodies analysis, then it will be more effective in achieving analysis learning than a pedagogy, which stresses comprehension. On the other hand, since Bloom's taxonomy assumes a logical progression, learning at any common lower level (i.e., basic knowledge, in this case) should be the same.

H3: (Basic Attitude Hypothesis) Experiential pedagogies will engender more positive attitudes than will nonexperiential pedagogies.

This hypothesis reflects Greenblat's contention that experientials are more enjoyable, fun and appealing than listening to lectures or reading a textbook.

H4: (Differential Attitude Hypothesis) An experiential pedagogy which provides a rich experience base will effect more positive attitudes than one which provides a less rich experience base.

A maxim credited to Confucius claims something like, "I hear, and I forget. I do, and I understand." At issue in H4 is the "do" aspect of experiential pedagogy. Specifically, computer technology provides the opportunity for mental, tactile, visual, and even auditory stimulation. Workbook exercises and related class discussion does not have the tactile and visual stimulation aspects, while lecture is essentially auditory delivery. This hypothesis ventures the proposition that attitudes are linked to experience, and the richer the experience base, the more positive the attitudes will become. Less rich experientials will have less positive attitudes than more rich ones because students will have less substance on which to form attitudes.

## METHOD

### Selection of Topic

The four hypotheses were tested with the use of an after-only with control group experimental design using random assignment of subjects. In this experiment, students enrolled in two sections of a principles of marketing course taught by the same instructor provided the subject pool. Two sections were used to attain group sample sizes approximating 30. The textbook adopted for this course was Principles of Marketing, ninth edition, (1987) authored by Jerome McCarthy and William Perrault and published by Richard D. Irwin. Although precise figures are unavailable, this text is claimed by Irwin sales representatives to be the market leader. In any case, it is widely adopted. Ancillary instructor's materials provided for adopters of McCarthy and Perrault (1987) include computer-aided exercises, a workbook of exercises, and a readings book.

Inspection of the computer and workbook exercises revealed a number of instances where both treated identical topics. It was decided to use the topic of "target marketing versus mass marketing" which is covered in the second chapter of the textbook. Described briefly, mass marketing is practiced by firms expecting small market share of the entire market by marketing a generic version of the product through mass distribution and mass promotion strategies. A target marketer, on the other hand, aims at a distinct segment of the market, anticipating large submarket share gained by a custom-tailored product, selective distribution channels, and specialized promotional appeals. Mass marketers realize low cost and low profit per unit, weak brand loyalty, but large volume of sales, while target marketers experience the opposite results. Either approach can be successful, depending on market and competitive conditions.

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### Descriptions of Treatments and Control

As noted above, students in each section were randomly assigned to each of three groups at the beginning of a class period. One group was led to the College of Business-Administration computer laboratory room; one group was taken to a separate classroom, and the control group remained in the original classroom.

The computer-aided exercise used in the experiment was taken from Computer-Aided Problems to Accompany Basic Marketing (McCarthy and Perreault, 1987). The exercise takes students into a situation in which company managers are comparing the profitability of a target marketing strategy with a mass marketing strategy. A computer spreadsheet gives information about both approaches. The spreadsheet focuses students' attention on the size of market segments, the "share" that a firm wins in that market, costs of blending a marketing mix to reach the market, and the revenue and profit relationships. Students are presented with brief scenarios in which they are to change several variables on the spreadsheet. The speed of the computer calculations means they can look at the problem from many different angles in a short span of time. They can see how a change in one aspect of the manager's plan may affect the rest of the plan. After the computer recalculates the spreadsheet, students are to interpret the new results and evaluate the profitability of a target marketing approach compared to a mass marketing approach. 'Within Bloom's taxonomy, the computer-aided exercise can be seen as concentrating on the application level as it deals primarily with the cost-revenue-market share-profitability relationships and generalizations involved. Although not strongly, one could argue that the computer-aided exercise also pertains to the analysis level as students are thrown into a problem-solving situation but at an extremely low level.

The workbook experiential was a written exercise selected from Learning-Aid (McCarthy and Perreault, 1987) which allows students to use information drawn from the text and lectures in four scenarios describing either mass marketing or target marketing. The focus of the exercise is to force students to discern whether a firm is using mass or target marketing. In each case, they are provided descriptions of activities and decisions such as marketing research, attitudes towards customers, importance of profit, and so forth. Students are asked not only to identify whether the scenario is a mass marketing or a target marketing situation, but also to justify their selection. Once all students had completed their written tasks, the instructor indicated the correct answer and a brief rationale as to why it was either mass or target marketing. While some application aspect of learning is evident in this exercise, it should be apparent that it is largely concerned with the comprehension level on Bloom's taxonomy.

The control group was assigned the task of reading and responding in writing to questions on an article entitled "Strategic Windows" by Derek Abell provided in the readings book (McCarthy, Grashof and Brogiwicz, 1987) accompanying the textbook. This reading describes how astute marketers predict changes in customers, technology, or other relevant forces and plan operations so as to be poised to take advantage of opportunities when they develop rather than reactively responding to them after they become reality. It does not treat target marketing or mass marketing per se; thus, the control group represented a nonexposure condition. Theoretically, its knowledge base represented

only the textbook and classroom coverage common to all students in the class. This coverage pertains to basic knowledge and, to some extent, the comprehension level on Bloom's taxonomy.

### Measurement of Dependent Variables

After reviewing the focal topic and the treatments, the authors judged that the first four levels of Bloom's taxonomy (basic knowledge, comprehension, application, and analysis) to be appropriate. Accordingly, objective tests in the form of ten true false and ten multiple choice questions were constructed to measure learning on each level. Thus, a total of eighty questions was developed as a testing instrument. These questions were arranged sequentially (i.e., one knowledge, then one comprehension, then one application, etc.) on the test to forestall fatigue effects.

As indicated earlier, the attitude dimensions were measured by adapting Burns and Sherrell's (1982) items to the present study. Subjects responded to each statement by using a five-point agree-disagree scale.

With regard to procedure, each group was administered its respective treatment, and as each subject completed the task, he or she was given the attitude measurement questionnaire to fill out before leaving. The very next class period, the objective test was administered to students at the beginning of the class. Students were not given any indication that they would be tested on the material in the next class; however, unannounced quizzes were identified on the course syllabus as part of the evaluation system.

## FINDINGS

### Group Equivalence

Initial analyses were performed to corroborate group equivalence. On the attitude questionnaires, subjects had provided demographic information. Analyses of variance determined no significant differences with respect to age, grade point average, or number of credit hours carried this semester, while Chi-square analysis determined no significant differences with respect to chosen major. The typical student participating in the study was 22.9 years old with a 2.91 overall GPA. About 23 percent were accounting majors, 10 percent finance majors, 14 percent management majors; 17 percent marketing majors and the remaining 36 percent represented other majors and undecided.

### Learning Effects

Table 1 contains the results of analyses of variance conducted on each of the four learning levels data. As a matter of background information, the average overall test score was found to be 66 percent correct with a high of 80 percent and a low of 45 percent. As can be seen in Table 1, no statistically significant differences were determined for the overall test grade, nor with the basic knowledge, comprehension or analysis levels; however, with the application level, the computer-aided group performed better (72%) than the other two groups which performed about equally (66%). In other words, the Experiential Learning Hypothesis (H1) was not supported, but the Learning Level Hypothesis (H2) was provided with some support.

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TABLE 2  
RESULTS OF ATTITUDE EFFECTS TESTS

Attitude Dimension*	Treatment Group			
	Computer-Aided	Workbook Exercise	Control	Probability
Perceived Knowledge	3.8	3.9	3.8	.68
Enjoyment	3.4	4.0	3.1	.0001
Perceived Benefits	3.3	4.0	3.3	.0001
Student-Teacher Relations	3.1	4.0	2.9	.0001
Overall Attitude	3.4	4.0	3.3	.0001
* Based on a 5-point scale				
	(60%)	(60%)	(61%)	
Overall Learning <sup>b</sup>	53.3	52.5	51.5	.58
	(67%)	(66%)	(64%)	

a Number correct out of 20; percent correct in parentheses

b Number correct out of 80; percent correct in parentheses

## Attitude Effects

A preliminary phase of the attitude dimension findings necessitated assessment of the reliabilities of the measures. Cronbach's alphas were computed for each set of items measuring each dimension, and based on inspection of intercorrelations, a few items were dropped to increase the reliability. Figure 2 identifies the dropped items and reveals the resulting Cronbach alphas. The perception of decision skills gained dimension exhibited poor reliability and was dropped from further consideration as a consequence. Of the remaining four attitude dimensions, the highest reliability was found to be .97 for enjoyment, while the lowest was .91 for student teacher relations. Subsequent analyses were performed on the average score for each attitude dimension as well as the average overall attitude composed of the four attitude dimensions retained after the reliability findings.

Analyses of variance revealed statistically significant differences on three of the four attitude dimensions, namely enjoyment, benefits gained and student-teacher relations. As can be seen in Table 2, no differences were determined for perceived knowledge gained. In all three instances, the workbook exercise was associated with more positive attitudes. As expected, the control group expressed the lowest attitudes on enjoyment and student teacher relations, while the control and computer-aided groups shared identical (low) attitudes on perceived benefits. As would be expected based on the attitude dimension findings, the overall attitude scores were found to exhibit statistically significant differences with the workbook exercise group again more positive than either other group.

These results do lend support to the Basic Attitude Hypothesis (H3) in that attitudes associated with experiential pedagogies were more positive than those with a nonexperiential pedagogy; although, the computer-aided pedagogy did not distinguish itself clearly in this regard. On the other hand, the Differential Attitude Hypothesis failed to

FIGURE 2  
ATTITUDE DIMENSIONS AND ITEMS USED TO MEASURE THEM\*

Dimension/Statements	Cronbach's Alpha
<u>Perceived Knowledge Gained</u>	.92
I gained insight into the problem of target marketing.	
I gained insight into the pressures faced by decision makers.	
I gained actual information from the exercise.	
It aided my understanding of target market decisions.	
It increased my awareness of the difficulties involved in target marketing.	
It increased my appreciation of the uncertainties faced by marketers.	
It increased my appreciation of the problems faced by marketers.	
I learned the general principles involved. (dropped)	
I learned the procedures of target marketing analysis. (dropped)	
<u>Enjoyment with the Experience</u>	
The exercise was fun.	
The exercise was boring. (reverse-scored)	
The exercise increased my interest in the course.	
The exercise was enjoyable.	
The exercise increased my enthusiasm to learn.	
The exercise increased my interest in the course.	
Exercises like this lead to a more relaxed exchange between students and teachers.	
Exercises like this will make other coursework enjoyable.	
The exercise was interesting. (dropped)	
Exercises like this lead to more student independence. (dropped)	
<u>Perceived Benefits</u>	.93
The exercise increased my sense of my personal abilities.	
It helped increase my own self-awareness.	
It increased my awareness of my own potential.	
Exercises like this will lead me to participate more in related class discussion.	
It increased my interest in learning in general.	
<u>Student-Teacher Relations</u>	
Exercises like this help students to perceive teachers more positively in general.	
Exercises like this help students perceive teachers more positively.	
Exercises like this promote better student-teacher relationships.	
Exercises like this lead to better peer acceptance.	
<u>Decision-Making Skills Gained (dropped)</u>	
The exercise was too low-level.	
It changed my perspective on some parts of marketing.	
I gained better decision making skills from the exercise.	

\* Adapted from Burns and Sherrell (1982)

garner support from the findings, as the computer-aided approach did not generate the most positive attitudes.

## DISCUSSION

This study sought to advance our understanding of the effects of experiential pedagogies from two perspectives. First, it attempted to analyze the learning

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level(s) pertaining to a pedagogy and found some evidence that this approach may have merit. Thus, the computer-aided exercise, which forced students' to experiment by changing variables and examining the profitability consequences on a spreadsheet, resulted in more learning on the application level of Bloom's taxonomy than did a workbook exercise dealing more with comprehension. The workbook experiential, on the other hand, failed to effect more learning overall or more comprehension than was attained by normal textbook reading and other classroom exposure. Neither experiential pedagogy was associated with greater overall learning. Related to the three central issues related to selection from among a host of pedagogical alternatives provided by the publisher of a principles textbook, the workbook exercises was apparently redundant to normal topic coverage and its use would be an inefficient use of this particular instructor's course time. If, however, the instructor had identified application as a salient learning level, the computer-aided exercise would be a useful pedagogical device to add to his/her current repertoire.

The second perspective concerns student attitudes. With this concern, the study found the workbook exercise to generate the most positive overall attitude and to cause that group of students to believe their experience was more enjoyable, more beneficial, and most conducive to good student teacher relations. Only in the areas of enjoyment and student teacher relations did the computer-aided approach perform better than the control. In short, while the relationship between improved learning and more positive student attitudes is not straightforward, one can generally claim, as has been shown in previous studies, that experientials do garner in students better feelings about their educational experiences.

As with any experiment, this study's generalizability is constrained by certain limitations such as sample/ population representation; measurement considerations; or topic specificity. Nevertheless, it does suggest that dissecting the learning level aspects of alternative pedagogies could prove fruitful in the future for both instructors and researchers as they debate the uses of various publisher-supplied teaching facilitators provided with a principles textbook. It has also broached a conceptual rationale (i.e., richness of the experience) which may ultimately help us to understand the attitude consequences of experientials. We urge those working with experiential pedagogies to take both factors into consideration in their future deliberations.

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