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RESEARCH ON THE EFFECTIVENESS OF USING A COMPUTERIZED SIMULATION IN THE BASIC MANAGEMENT COURSE

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ABSTRACT

This paper compares the level of performance in the computerized total-firm simulation with their performance in the traditional textbook-and-lectures part of the course for 210 students in the junior-level basic management course. Analysis is done in relation to (1) differences in general academic performance measured by each student's total grades at the university, (2) age, (3) previous business experience and (4) attitude toward the simulation itself. The results show that, in general, students do about the same in the unstructured analysis and decision-making environment of the simulation as they do in the traditional "memorize and parrot back" part of the course, although the required skills are different.

INTRODUCTION

About the only thing that teachers of the basic management course agree on is that the course should help the students become better managers than they would be if they had not taken the course. As Athanass- lades [1] found in his survey [Table ii, there is wide disagreement even as to what the course should teach a philosophy and broad concepts, or specific techniques and how to apply them

TABLE 1
RANKING OF OBJECTIVES OF THE BASIC MANAGEMENT COURSE

	Ranks							
	1		2		3		4	
	No.	%	No.	%	No.	%	No.	%
Teach principles	11	23	11	23	22	46	4	8
Create awareness of field	15	31	18	38	13	27	2	4
Instill philosophy	18	38	17	35	13	27	0	0
Teach skills	4	8	2	4	0	0	42	88

Source: Anthanssiades(1)

With such a fundamental disagreement over what should be taught, it is not surprising that there is disagreement about the various specific methods of teaching the material.

The author feels that it is necessary to teach the students the science of both the broad concepts and the specific techniques, but that this is not enough. The students must also master the art of being able to apply these concepts and techniques in specific situations on the job. A business simulation is one way to give students practice in doing this.

Background

Arguments for and against simulations have been presented in many articles and papers and are too well known and complex to be reviewed here. These studies have dealt primarily with students in relatively advanced courses. A question which has not been as widely explored is the relative performance on simulations versus standard teaching methods for students in the basic management course where the material is of a general survey nature and the students have very little, if any, business coursework background to call upon [2, 3, 4, 5, 6].

Kolb [8, 91] developed an experiential learning model from which he develops the Learning Styles Inventory (LSI) pattern that identifies the participant as a Converger, Assimilator, Accommodator or a Diverger. Brenenstuhl and Catalanello [3], [5] were only partially successful in using Kolb's [5] in a study of approximately 500 students in the basic management course, as were Johnson and Stratton [7] in an introductory behavior course. Ruble [10] points out a possible weakness in Kolb's [5] in that the ranking forces the data to fit into two opposing dimensions when they may not, in fact, be opposing. Ruble's research supports the possibility of people being high on many learning abilities or low on many abilities.

Since some successful businessmen were excellent students and others were only average or marginal students in college, and since so many students who were at the top of their classes do not have comparable success in business, it seems logical to assume that there is not an exact positive correlation between high college grades and success in business. Reflection on how most college courses are conducted brings out that in most courses the student reads the texts and listens to the lectures (not necessarily in that order), and then takes a quiz on which he is asked to parrot back certain of that information or work a problem with slightly different numbers. It is obvious that this is a different skill from analyzing a situation, creatively determining alternative courses of action, and making and implementing a decision. It also seems logical that some people would be better at one of these skills and some better at the other, some good at both, and some not good at either. However, the two skills do have certain things in common, too, in that both take a certain amount of intelligence and a lot of hard work, which some people may be more willing to do than others of equal ability.

Purpose

The purpose of this paper is to compare the performance of students in the business simulation part of the course with their performance in the lecture-and- quizzes part of the course to determine if there is a difference in their level of performance in these two dissimilar learning activities and what factors might help account for any differences.

Hypo thesis

It was hypothesized that for some students there would be no difference and for others there would be differences in levels of success between the two parts of the course; but that since both parts are inherently intellectual (rather than manual), in general those students who were above or below average on one would be above or below average on the other, also.

THE STUDY

The simulation is of a small manufacturing company; and the students make production, marketing and financial decisions, including specifically hiring and firing employees as needed to carry Out those decision. There are no random variables (or luck) to influence the outcome. For a more complete description of the simulation, see Estes [6].

The course is a junior-level course required of all Business Administration majors and taken as an elective by students from other colleges. Therefore, the students have little background preparation in business to which to relate the concepts in the course. The simulation is best suited for working with the concepts and tools of the planning and control functions of management; but by working in groups to make decisions under future uncertainty, and having to live with the continuing results of those decisions, the students experience concepts of leadership and interpersonal behavior inherent in the directing function of management.

With the exception of the simulation, the course is taught in the standard manner, with a standard textbook, lectures and three films. Three one-hour quizzes, each covering one-third of the course, each count as one-fourth of the student's course grade. These are standard tell me back what I told you" quizzes. While several factors are involved in determining the students' grades in the simulation, it can be summed as making profit while providing stable employment and sound financial management (quite lifelike and completely different from the skill required to do well on quizzes). The simulation counts as the remaining one-fourth of the students' grades, making its value equal to one quiz.

RESULTS

Analysis by course grade in Table 1 shows that students who made a course grade of A or B also did better In the simulation part of the course, with 62 per cent of the A students and 49 per cent of the B students also making an A on the simulation. This compares with only 5 per cent of the C students, 12 per cent of the D students and no F students making an A on the simulation.

The question of how much the performance was due to specific aptitude for this one course is analyzed by comparing the grade on the simulation and in the course with each student's overall grade point ratio (GPR) out of a possible 4.0. Table 3 shows that students with the highest

TABLE 2
COMPARISON OF SIMULATION GRADE AND COURSE GRADE

Course grade	Simulation Grade									
	90–100	80–89	70–79	60–69	50–59	40–49	30–39	20–29	10–19	0–9
A	18	7	3						1	
B	28	14	11	1	1					
C	3	18	17	15	3	1	3			1
D	4	3	6	7	8	2	3		1	
F		1		2	5	4	3		5	7
S	3			1		1		1		
Number of students	52	44	37	26	17	8	9	1	7	8

GPR of 3.5 to 4.0 outperformed all other groups in both the total course and in the simulation, with 55 per cent of them making an A in the total course and 45 per cent of them making an A on the simulation. There was a slight difference between that and the performance in the next group of 3.0 to 3.5 in that 40 per cent o this group made an A on the simulation while only 20 per cent made an A in the course; but if the number of students making grades of A and B are combined for each, they are almost identical. Students with lower total GPR did worse on both the total course and the simulation grades. The larger number of students making grades of F on the simulation than on the total course is largely due to the combination of a University policy which lets students drop a course as late as midsemester without penalty and the fact that the simulation is primarily in the last half of the semester. Students doing badly on the course know it by midsemester and many drop out; but by the time they learn that they are failing the simulation, the course is over. The low grade on the simulation (which counts one-fourth of their total grade) turns some low course grades of C and D into grades of D and F.

Since management includes much material which is basically "common sense", how much of the students'

TABLE 3
COMPARISON OF COURSE GRADE AND SIMULATION GRADE RELATIVE TO STUDENTS' CUMULATIVE GRADE POINT RATIO

Expressed as the Number of Students in each G.P.R. Category

GPR	Course grade/simulation grade						Number of students in GPR category
	A	B	C	D	F	S	
3.5–4	12/10	8/5	1/4	1/0	0/3	0/0	22
3<3.5	9/18	20/10	14/10	1/5	0/2	1/0	45
2.5<3	3/17	19/21	30/10	18/13	12/24	3/0	85
2<2.5	2/3	5/7	12/9	12/7	11/16	0/0	42
1.5<2	0/2	0/0	3/2	1/0	0/0	0/0	4

performance in the course is due simply to having lived longer and, in the process, gained work experience of one kind or another outside of this classroom? Table 4 shows the relationship of age to performance in the course and in the simulation. Strangely enough, all groups under thirty show approximately twice as many simulation grades of A as there are course grades of A. When grades of A and B are combined, however, most of this difference disappears for students under 30 years of age. With only seven students over 30 years old, it is hard to make a meaningful statement; but it is interesting that approximately half of this group made A on both the simulation and the course, which was not true for any other age group.

TABLE 4
COMPARISON OF COURSE GRADE AND SIMULATION GRADE RELATIVE TO STUDENTS' AGE

Expressed as the number of Students in each Age Category

Age	Course grade/simulation grade A	B	C	D	F	Number of students in age category
under 21	8/16	24/25	35/17	9/16	5/7	81
21-24	10/23	22/14	24/14	17/8	19/33	92
25-29	5/9	7/3	4/5	5/1	3/8	24
30-39	4/3	0/2	1/1	2/1	0/0	7

Tables 5, 6, and 7 show the relationship of actual work experience to success in managing the simulated business. Table 5 shows that for students with no managerial experience, students with no work experience at all did somewhat better than students with one to three years of operative-level experience (40 per cent above C relative to 33 per cent) Students with more than three years work experience did best, with fifty per cent making above C. Tables 6 and 7 show that, in general, students with more managerial experience did better in the simulation.

TABLE 5
SIMULATION GRADE RELATIVE TO WORK EXPERIENCE -- OPERATIVE LFVEL ONLY

Expressed As Percentages

Simulation Grade	Years of Experience None N=28	1-3 N=50	More than 3 N=93
90 - 100	18	18	27
80 - 89	22	16	23
70 - 79	18	12	20
60 - 69	11	14	14
50 - 59	14	10	5
40 - 49	4	10	1
30 - 39	4	10	3
20 - 29	0	0	0
10 - 19	4	4	2
0 - 9	7	6	4

TABLE 6
SIMULATION GRADE RELATIVE TO TOTAL YEARS OF OPERATIVE AND MANAGERIAL WORK EXPERIENCE WITH LESS THAN FOUR YEARS MANAGERIAL

Simulation Grade	Years of Experience 2 - 5	6 - 10	11 - 17
90 - 100	4	3	2
80 - 89	2	1	3
70 - 79	1	2	
60 - 69		1	1
50 - 59	2	1	
40 - 49			
30 - 39			
20 - 29		1	
10 - 19			
0 - 9	1		
Total	10	9	6

TABLE 7
SIMULATION GRADE RELATIVE TO TOTAL YEARS OF OPERATIVE AND MANAGERIAL WORK EXPERIENCE WITH FOUR YEARS OR MORE MANAGERIAL

Simulation Grade	Years of Experience 6 - 10	11 - 15	16 - 20
90 - 100	1	1	2
80 - 89	1	1	2
70 - 79		2	1
60 - 69	1		
50 - 59			
40 - 49	1		
30 - 39			
20 - 29			
10 - 19			1
0 - 9			
Total	4	4	6

Table 8 shows the correlation between four variables using two-tailed t tests. It was evident that there were no significant correlations between age and any of the other variables, i.e., simulation grade, course grade or GPR. The correlation analysis showed significant (p=. 0001) correlations between the simulation grade and the course grade; the simulation grade and the student's *GPR;* and the *GPR* and the course grade. Because of computer programming difficulties, it was not possible to run correlation analysis on work experience, but Tables 5, 6 and 7 make this fairly obvious.

TABLE 8
CORRELATION ANALYSIS OF PERFORMANCE FACTORS

	Simulation Grade	Course Grade	GPR
Age	-.07	.02	.06
Simulation Grade		.54**	.32**
Course Grade			.50**

**.0001 level of significance

An important factor in evaluating the effectiveness of any teaching approach is the reaction of the students to that methodology. Students at the junior level have limited experience with role playing, incident technique, experiential learning, etc.; so the students were asked to Indicate their preference on how the course should be conducted in the future between lecture only, lecture and simulation, and lecture and cases. Since the questionnaire was administered the last week of class, when the students knew their relative performance in the simulation, it was expected that those doing well on the simulation would prefer it, and those doing badly on the simulation would prefer that It be eliminated from the course. As shown in Table 9, a surprisingly large number of students felt that the simulation should be kept in the course even though they personally had done very badly on it and their course grade had suffered substantially from it.

TABLE 9
STUDENT PREFERENCE ON TEACHING METHODOLOGY RELATIVE TO GRADE ON BUSINESS SIMULATION

Grade on simulation	Lecture only	Lecture and simulation	Lecture and cases
90–100	7	40	5
80–89	4	31	8
70–79	5	22	10
60–69	3	12	11
50–59	5	8	4
40–49	3	4	1
30–39	2	3	4
20–29			1
10–19		1	4
0–9	1	2	5
Total	53	123	30

CONCLUSIONS

Although the skills required for doing well in the simulation are substantially different from the skills necessary for doing well in the standard part of the course, there was no great difference in the relative performance levels of the students. Most students who were able to do well on one also did well on the other; and most of the students who did badly on one also did badly on the other. There were a few students who did better on one than on the other.

The results supported the hypothesis, except that it had been expected that there would be a little greater difference in the degree of success or failure between the two types of skills. This seems to contradict Kolb's hypothesis and to support Ruble's.

The students' strong support for the use of the simulation even when it hurt their grade, as shown in Table 9, came as a surprise, and it indicates that they may feel the simulation helped them learn the course's subject matter and/or at least made the course more interesting to them.

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