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WHAT SIMULATION USERS THINK PLAYERS SHOULD BE LEARNING FROM SIMULATIONS

Jerry Gosenpud & John Washbush
University of Wisconsin-Whitewater

ABSTRACT

The purpose of this study was to survey simulation users to determine what they thought players should be learning. The method was a two-part survey sent to 574 professionals. Part 1 presented respondents with nine learning-element Likert scale, and part 2 of the survey was an open-ended question, containing the request to describe representative topics, items, and questions the respondent might use to evaluate student learning from a simulation. Responses were received from 89 individuals. The results show great variety in what simulation users expect students to learn. In addition simulation users were much more philosophical than detailed in their responses to the open-ended question.

INTRODUCTION

In criticizing public schools 24 years ago, Charles Silberman (1970) said that what is mostly wrong with public schools is mindlessness. "If they (teachers and principals) make a botch of it, and an uncomfortably large number do, it is because it never occurs (to them) to ask why they are doing what they are doing--to think seriously or deeply about the purposes and consequence of education." In other words, it is important to at least one educational critic that educators attend seriously to the purpose of their teaching.

This paper concerns the purpose of one educational experience frequently used on the college level, the computerized total enterprise simulation There is little research that tells us exactly what students are learning while they are playing these simulations. As Whitely and Faria (1989) pointed out, the pedagogical value of games remains unclear. Thus, both the purpose and educational value of games are very open to investigation.

On the other hand, there is research on learning from courses using simulations. Wolfe (1990) summarized an extensive body of literature comparing course sections which did and did not include simulations with regard to the delivery of total course material This review suggested that sections with games do at least as well as those without them in imparting factual and conceptual knowledge As reported by Keys and Wolfe (1990), studies by Kaufman (1976), McKenney (1962, 1963), Raja (1966) and Wolfe & Guth (1975) found superior results for game-based versus case groups in course grades, performance on concepts examinations, and goal setting exercises

While these studies have captured what is learned from a course that includes a simulation, they did not identify what is learned from the simulation itself. There are some studies that reveal hints about the learning-taking place as a result of playing a simulation. Whitely and Faria (1989) found that simulation players scored better on the quantitative items of the final exam than non-players, but for non-quantitative items, players did no better. This suggests that simulation players gain quantitative expertise. Teach and Govahi (1988) surveyed 62 alumni to assess how well certain teaching methods helped them learn a set of predefined skills. The respondents perceived that simulations were best in helping them set and evaluate objectives, solve problems systematically, make decisions, forecast, adapt to new tasks, and manage time. From a personal view, Goosen (1991) discussed learning from playing a simulation. He learned that losing money brought great disappointment that the fruits of analysis did not come immediately, but that thoughtful, hard work often brought rewards later on.

It is possible that what is learned from a simulation is not easily measurable. The types of learning discussed in the Teach and Govahi and Goosen articles above (for example, goal setting and the understanding that the fruits of analysis take a while) are not easily measured. Additionally, Wellington and Faria (1991) have found no relationship between exam scores on one hand and simulation play, level of simulation performance and recency of simulation play on the other. They have therefore suggested that simulation play involves skills which may not be directly measurable by normal multiple choice exams

This study took a different approach in exploring what learning occurs as a result of playing a simulation. In it we asked simulation instructors what they thought players should be learning.' There is not a great deal of research on that issue, but at least one previous study has dealt indirectly with **it.** Anderson and Lawton (1992) surveyed 146 professors who use simulations in their classes. They presented respondents with a variety of ways to grade simulation learning and performance and asked them which ones they used (implicit in their answers is what they expect students to learn) Results showed that 93% of those using a simulation graded on competitive performance. Over 50% graded on the quality of written plans, analytic papers, and oral performance reviews. Approximately fifteen percent graded on forecasting ability, peer evaluation, and rote knowledge of game rules and procedures. These results suggest that most instructors believe that students should learn to perform well in the simulation and to plan and analyze their own performance, and that some instructors believe students should be learning to forecast, constructively cooperate, and memorize game rules and procedures.

Our approach was more direct The purpose of this study was to survey simulation users to determine what they thought players should be learning, and our approach was to simply ask them that question.

This study is part of a larger set of projects concerning participant learning in the simulation. Is **it** the same or different from what is intended by teachers, trainers and designers? Is learning identifiable and measurable? Does more learning take place with superior performance?

These questions are important. If we know what simulation participants are learning and what teachers want students to learn, we can better assess whether actual learning is instructor-intended and whether or not and to what degree instructor-expected learning occurs. In addition we can begin to measure whether or not a particular set of students are learning what other students are learning. More specifically, the present researchers are interested in the relationship between simulation competitive performance and learning. In order to research this topic we must identify what leaming is valuable, and then we can then ascertain if those who are performing better are also learning more of what is important.

METHOD

The researchers designed a two-part survey of perceptions of intended learning effects of simulations. Part 1 of the survey form presented respondents with nine learning-element Likert scales Each scale used the semantic differential "None" and "Considerable" at its extremes. Respondents marked each scale to indicate the degree to which whole enterprise simulations should promote a specific kind of learning. The learning elements were.

1. Marketing mix management
2. Production and inventory management
3. Cash management
4. Raising and investing capital
5. Financial statement and cost analysis
6. Strategic decision making
7. Strategic management theory
B. Group process effectiveness
9. Communication skills

These nine were used because they were mentioned by a group of simulation users as me most important elements learned in a simulation in a session at the 1992 ABSEL conference

Part 2 of the survey was open-ended and appeared on a separate page. It contained only the request to describe representative topics, items, and questions that would be part of an exam the respondent might create to evaluate what students have learned from a simulation hypothetically used.

Surveys were distributed to 574 professionals from three sources One-hundred and twenty-seven surveys were distributed with packets to registrants at the 1993 ABSEL conference in Savannah; 91 were sent to individuals on the mailing list for THE BUSINESS POLICY GAME (Cotter & Fritzsche, 1986); 356 were sent to people on the mailing list of MICROMATIC (Scoff et al, 1992) [2]

RESULTS

Responses were obtained from 89 individuals (16%) 01 the 80, eight did not use a simulation in the classroom, 10 specifically said they used THE BUSINESS POLICY GAME, 19 said they used MICROMATIC Six said they used the Business Strategy Game, 2 the EXECUTIVE SIMULATION, 2 THRESHOLD, 2 TEMPOMATIC, 2 THE MANAGER, 1 BRANDMAPS, and 1 STRATEGY. Five people said they used simulations for management training.

Liken Scale Results

Table 1 shows response-scale means and standard deviations. A response of 'None (to the question," to what degree should the simulation promote this kind of learning") was scored 1 and intervals moving toward "Considerable" were scored incrementally to a maximum of 9.

TABLE 1
THE EXTENT TO WHICH LEARNING SHOULD OCCUR IN A SIMULATION

LEARNING ELEMENT	MEAN	SD
Marketing mix management	7.03	1.84
Production and inventory management	7.41	1.54
Cash management	7.23	2.09
Raising and investing capital	6.62	2.10
Financial statement and cost analysis	7.57	1.64
Strategic decision making	7.06	1.44
Strategic management theory	5.90	2.32
Group process effectiveness	7.04	1.94
Communication skills	6.74	2.11

Table 1 indicates mat respondents believed that most elements should be pursued to a considerable degree. The highest score was for Strategic Decision Making, the lowest for Strategic Management Theory Relatively high scores were given to Cash Management, Financial Statement and Cost Analysis, and Production and Inventory Management.

Responses to the Open-ended Question

Only 76 subjects responded to the open-ended exam-content question Eleven respondents specifically protested the use of exams to assess simulation learning. These individuals apparently *felt* that the simulation itself is a sufficient test of learning. Protest was also the possible motivation for the 13 returned the question with no response and for some of those who did not even send back the sheet containing the part 2 open-ended question.

Virtually all-52 respondents who offered a suggestion gave multiple responses (thus the following frequencies will add up to many more man 52). Also, the responses varied tremendously. Some individuals suggested test items; some responded with exercises; others stated what a test should cover. Some gave details; others were very general and philosophical. Some wrote a full page, others a few words. The learning skills which the respondents wanted evaluated also varied tremendously. The range was from strategic to integrative to analytical to functional to computer to group process to self-awareness. The greatest number of respondents wanted their students to obtain decision evaluation skills and a general understanding of both the simulation and what worked and what did not for them. The second greatest number wanted their students to obtain financial management skills Tables 2 and 3 contain summaries, table 2 for the most general responses to the open-ended question, table 3 a categorical summary of the bulk of the rest

TABLE 2
SUMMARY OF VERY GENERAL SUGGESTIONS TO OPEN-ENDED QUESTION

General Exercises or Reports Assessing General Understanding Formal plan or a continuously revised formal plan (7)
Decisions requested to hypothetical situation similar to simulation *(7)*
Class Presentation or paper reviewing simulation (6)
Stockholders Meeting (2)
Specific purpose reports such as budgets or forecasts (2)
Competitor Analysis (1)
Paper comparing company with one in real world (1)
Annual Report (1)
Exams or Exam Question on General Skills or Concepts
Exam on simulation mechanics (8)
Exam similar to annual report (3)
Exam questions evaluating simulation decisions (4)

TABLE 3
SUMMARY OF DECISION EVALUATION, STRATEGIC, FUNCTIONAL, GROUP PROCESS AND ANALYTICAL SUGGESTIONS TO OPEN-ENDED QUESTION

Decision Evaluation
Questions assessing effectiveness or inter-relatedness of decisions (4)
Strategic Application of strategic theory (1)
Understanding that more one strategy could be successful (1)
Analytical, for example, testing cause and effect (5)
Functional Exams testing understanding of functional skills (2)
Financial tests on financial interpretation ability (11)
Exams or questions on specific financial skills and issues such as ratio analysis, determinants of stock price (8)
Requirements to make decisions from instructor-created financial statements (2)
Production-related, such as questions on inventory management (4)
Marketing related such as questions on forecasting (3)
Group Process Skills (6)

DISCUSSION

These data reflect a wide spectrum of thought about the assessment of learning from the simulation. Even the Likert-scale data can be interpreted as reflecting a wide variety of opinions. Scores for six of the nine learning element items averaged about seven or more on the nine-point scale. Apparently the majority of simulation users expect students to learn well six general sets of skills. This is a considerable range.

The lack of detail in the responses to the open-ended question is also noteworthy Only twelve people gave actual test items, and only thirteen stated learning goals to be evaluated with an examination. The greatest number of responses involved exercises tapping general game understanding. The most thorough answers were philosophical, discussing the relative merits of various approaches to evaluation, for example. The vast majority of respondents provided little detail about assessing what students should be learning from the simulation. Most of these respondents did not indicate that they prioritize learning goals or use simulations to help students learn predefined pedagogical objectives. Instead, they apparently use the exercise and let students learn whatever comes to them.

Not clear is whether the variety of responses, lack of detail, and the protests reflect the vast learning potential of the simulation, a negative attitude toward clearly defining what students should be learning from computerized games, uncertainty about what and how things are most appropriately tested, or merely an attitude that tests are irrelevant

Whether one should define learning goals and teach towards them is open to argument, but there are those (Gagne, 1968: Gartner, 1993) who believe that student outcomes ought to be thought through by the instructor. It appears from this sample, though, that many simulation instructors do not teach toward predefined learning goals.

The authors of this article are not unconditionally in favor of setting specific goals and teaching only towards them. Both of us value what is naturally and spontaneously learned from experiential situations, and both of us see complex and difficult problems in defining and testing learning emerging from participating in computerized simulation games We agree with those in the sample who

-See dangers in giving tests

-Believe that an exam can cause the learner to focus too narrowly

-Contend that the simulation in and of itself is full, complex and has long term benefits

-Believe that given the richness of the experience, exams may be inappropriately narrow as evaluations of learning

However, we also see several dangers in not defining learning goals and not assessing their accomplishment. First, these leave the instructor out of the learning equation (except as an experience organizer). By just giving the experience and not influencing what the students get out of it**,** the instructor may show little concern for student outcomes. Is learning the sole responsibility of the student? Second, several of our previous studies (Gosenpud and Washbush, 1993, Washbush and Gosenpud, 1993; 1994) have suggested that (1) simulation competitive performance is not a good indication of what is learned, (2) successful performers do not learn more than less successful ones. Thus, we believe that teachers do not know, from performance results alone, whether students are learning or not. Given this, and given the (not universally held) value that grades should reflect learning, instructors should understand ahead of time what is likely to be learned in a simulation, think through which types of learning are the most valuable, and assess on those bases.

Several important questions remain. For example: Do participants actually learn everything there is to learn? Should teachers just give the exercise and let students learn whatever comes to them without the teacher prioritizing? Lack of focus in the Likert data, lack of detail, and the great variety of the answers to the open-ended question suggest that's what teachers are in fact doing. Whether teachers should prioritize, teach towards predefined learning goals, and determine students' attainment of those goals are questions not answered here. What the data of this study indicate is that teachers are not doing these things.

NOTES

1. The long term purpose of studies such as this are to better understand what is learned in the simulation. This study's focus is on what users think *should* be learned from a simulation.

2. The number of individuals contacted is surely less. Many ABSEL members are on one or both mailing lists and the lists likely contain some of the same individuals.

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