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# MOVING TOWARD A "THEORY" OF THE USE OF SIMULATION GAMES AND EXPERIENTIAL EXERCISES

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## ABSTRACT

The paper extends previous thinking by the authors with regard to the major variables which should be considered in the use of games and experiential exercises. Using the five classes of variables presented in an earlier work: (1) the business concepts taught, (2) the nature of the game/task, (3) game conduct, (4) participant attributes, and (5) user attributes, a series of causal relationships are postulated. The seventeen propositions which eventuate from this programmatic reasoning process serve a necessary intermediate step to empirical tests.

## INTRODUCTION

At the 1977 ABSEL Conference in Wichita, Kansas, a paper was presented in which the authors sought to bring to the attention of simulation game and experiential exercise users a number of variables which they believed should be considered in the choice, administration, and evaluation of the game or exercise [2]. The authors couched their comments as "pretheory" in that while several variables were developed conceptually and with numerous examples, the "theorizing" was restricted to a normative statement warning the user to be sensitive to each consideration and factor in the use of games and experientials.

Since that time, other theorists and researchers have made progress in the form of observations or empirical results [3; 4], Not all comments, of course, have sprung from the Burns-Gentry paper. In fact, very little research seems directly attributable to the 1977 paper. One reason for the paucity of attention may be attributable to the pretheory's form. When the paper was presented, Duane Hoover, in a comment from the audience, issued to the authors a challenge to arrange the variables into a framework more amenable to logical scrutiny and empirical test. The present paper seeks to move the original thinking further down the road and positions it in a form more suited to necessary, rigorous examination.

## REVIEW OF THE PRETHEORY AND OPERATIONALIZATION OF THE VARIABLES

The original paper contended that a number of variables must be considered simultaneously by the exercise/game user. The basic model postulated~

GAME USED (NATURE, CONDUCT) f(CONCEPTS TAUGHT)

modified by (STUDENT ATTRIBUTES, INSTRUCTOR CONSIDERATIONS)

In the interim between the original paper and this one, the authors have reexamined the variables and have refined their definitions along more operational lines, Figure 1 contains the more specific descriptions. (These descriptions should not be taken as operational definitions.) Some minor modifications from the original definitions have been made (e.g., the precision variable) , and the interested reader is referred to the original paper for comparisons.

FIGURE 1
OPERATIONALIZATIONS OF THE VARIABLES

NATURE VARIABLES

| | |
|---|---|
| Duration: | How long the exercise lasts: number of decision phases, number of days, or weeks it takes the exercise to run |
| Decision Variables: | Absolute number of decisions or phases over the Duration |
| Results Sharing; | Degree to which participants formally share the results of their game or exercise experiences with one another |
| Participant Grouping: | Number of participants in a group |
| Course Integration: | Amount of time devoted to the exercise, administration, and teaching related concepts |

CONDUCT VARIABLES

| | |
|---|---|
| Accountability: | Ability to relate individual results/learning to exercise decisions/performance |
| Autonomy: | Individual responsibility for performance versus group consensus decisions |
| Participant Involvement: | Amount of time required (per week or semester) for the average participant |
| User Involvement: | Amount of time required (per week or semester) in teaching and administering the game and evaluation of participants |

CONCEPT VARIABLES

| | |
|---|---|
| Complexity: | Simplicity of the concept versus its complexity; the ease with which the concept(s) is understood |
| Theoretical Nature: | Degree of abstraction in the concept; pragmatic (operational) versus theoretical concepts |
| Functional/ Environmental Scope: | Number of business functions and out-side considerations involved |
| Precision: | Imprecise (implicit) versus precise (explicit) relationship of concepts to business decisions in the exercise |
| Stochaticism: | Degree of random variation in the |

| | |
|---|---|
| | concept(s) versus degree of determination in the concept(s) |
| Number: | Number of concepts or subconcepts to be taught or used |

STUDENT ATTRIBUTES VARIABLES

| | |
|---|---|
| Ability to Learn: | Capability of participants to learn due to intellectual level and situational factors |
| Willingness to Learn: | Attitude toward learning, positive to negative |
| Ability to Participate: | Amount of outside interests, obligations or other constraints on participants' time |
| Willingness to Participate: | Attitude toward participating, positive to negative |
| Number: | Number of students in the class |

USER ATTRIBUTES VARIABLES

| | |
|---|---|
| Motive for Use: | Self-serving versus student-serving motive |
| Familiarity with Topic: | Number of years user has studied, taught or worked with the topic |
| Teaching Philosophy: | Amount of effort expected of the student in the course |
| Choice Set: | Awareness of other exercises which could accomplish the same or similar ends |
| Resource Base: | Amount of resources available for running the exercise |

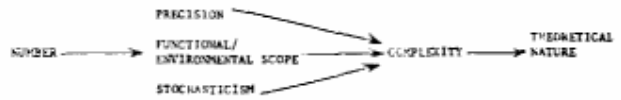
## CASTING THE THEORY

Blalock [1] points out that. a necessary intermediate step between verbalization of a theory and the testing of the theory is the casting of the theory in some causal framework. More specifically, he proposes that the theorist compose inventories of causes and inventories of effects within his variables and endeavor to assemble them into flow diagrams with chains, loops, and blocks of variable linkages. The process and final result serve to clarify the operations of the variables by identifying logical starting points, expected impact points, and complex interactions. This causal casting of the variables was attempted separately with each of the five variables sets. The resultant causal diagrams are portrayed in Figures 2 7 and discussed In turn. The linkages are presented as propositions.

## PROPOSITIONS WITHIN VARIABLE SETS

The causal linkages diagram gives rise to propositions regarding the expected impact of the various factors on one another. Two sets of propositions are offered:
one set for within variables and one set for across variables. Each is related In turn. The term "exercise" is used throughout and refers to games as well.

FIGURE 2
DIAGRAM FOR BUSINESS CONCEPTS LINKAGES




Concepts Variables Propositions

Proposition 1. More business concepts will entail more functional and environmental scope.

Proposition 2. Greater functional and environmental scope, less precision, and more stochasticism in the concepts will entail greater complexity.

Proposition 3, More complexity will entail more theoretical nature of the concepts.

A small number of decision variables necessarily delimits the scope of concern while large sets pg decisions open up the scope. Complexity mounts as the results of input decisions become more vague, are subject to more unsystematic variation, and as the scope of the problem broadens. Finally, greater complexity requires more abstraction to envision the operation of the concept.

Game Nature Propositions

Proposition 4. More decision variables in the exercise require larger participant groups and longer duration.

Proposition 5. More results sharing and larger groups lessen the duration of the exercise.

Proposition 6. Longer duration of the exercise requires greater course integration.
It is fairly obvious that large exercises offer the opportunity and indeed inspire the formulation of teams. The more

FIGURE 3
DIAGRAM FOR GAME NATURE LINKAGES

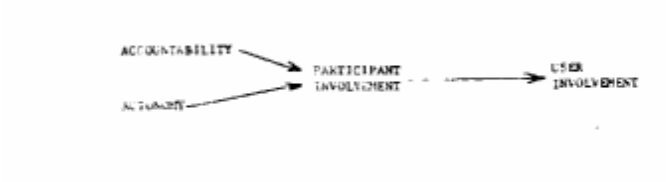

decision variables, the greater the necessity for specialization within groups and the longer the exercise must last in order for all of its interactions and relationships to become evident to the players. On the other hand, the more the teams share results and the fewer teams there are (i.e., larger groups) the shorter will be the duration of the exercise. Finally, exercises of long duration should require more course integration to introduce, administer, and discuss in class.

Game Conduct Propositions

Proposition 7. Accountability and autonomy will positively affect participant involvement in the exercise.

Proposition 8, Greater participant involvement will necessitate more user involvement.

FIGURE 4
DIAGRAM FOR GAME CONDUCT LINKAGES



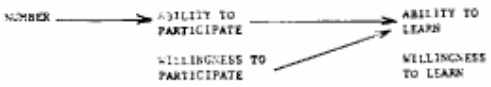

The more accountable participants are for their decisions in the exercise, the greater will be their involvement eventuating from the explicit reward and punishment system operating. Similarly, the more autonomy provided for participants, the greater will be their involvement in the exercise due to their lessened ability to rely on others. At the same time, more participant involvement infers greater user involvement in the forms of game administration and counseling of individual participants.

Student Attributes Propositions

Proposition 9. The number of students in the class will negatively affect their ability to participate in the exercise.

Proposition 10. The ability to participate and the willingness of students to participate in the exercise will positively affect their ability to learn.

FIGURE 5
DIAGRAM FOR STUDENT ATTRIBUTE LINKAGES




Large classes tend to discourage individual participation in the exercise for a number of reasons. The use of teams is a common method of overcoming the large class problem, but it is well known that teams, especially large teams, diffuse responsibility and allow individual students to dominate or to subordinate themselves. In the same line of reasoning, a lessened ability to participate decreases opportunities for learning. Obviously, students with a low interest level or reduced willingness to learn will not demonstrate the same ability to learn as those with greater motivation. On the other hand, the willingness to learn factor is unrelated to other variables in this set.

User Attributes Propositions

Proposition 11. Familiarity with the business topics being taught and the user's teaching philosophy will affect the user's motive for using a particular game or exercise.

FIGURE 6
DIAGRAM FOR USER ATTRIBUTE LINKAGES


Since the user motives variable eludes quantification, it is impossible to be more specific than to simply propose that topic familiarity and teaching philosophy will be linked to user motives. It seems obvious, for example, that the philosophy of "learning by doing" will be correlated with the use of games and experientials. Alternatively, one might suspect that great unfamiliarity with a topic could inspire the user to use exercises to either gain familiarity or to distract students from the teacher's unfamiliarity. The user's resource base and choice set size are unrelated to variables in this set.

PROPOSITIONS ACROSS VARIABLES SETS

Proposition 12. The theoretical level of the business concepts being taught by the exercise will affect the amount of course integration.

Proposition 13. The amount of course integration will affect the amount of user involvement with the exercise.

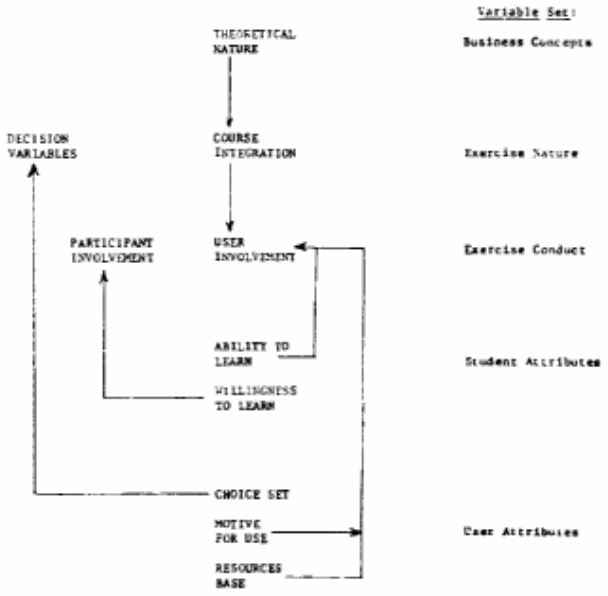
Proposition 14. The resource base and user's motive for use of the exercise will affect the degree of user involvement with the exercise.

Proposition 15. The ability of students to learn will affect the amount of user involvement with the exercise.

Proposition 16. The willingness of students to learn will affect the amount of student involvement with the exercise.

Proposition 17. The user's choice set of games and exercises will determine the decision variables in the chosen exercise.

FIGURE 7
DIAGRAM FOR ACROSS-VARIABLE SET LINKAGES*




* Only Across-Variable linkages are shown. See Figures 2 - 6 for within-variable set linkages.

It seems logical to expect greater integration of course presentations with the exercise or game being used with concepts which are more theoretical in nature, for most students possess only a limited capacity to formulate theories, and the Instructor usually finds himself investing a considerable amount of time helping or encouraging them to develop concepts, generalizations, rules, and testable hypotheses. The most appropriate place for such instructions would seem to be in class presentations. At the same time, the user will necessarily devote more time (involvement) to the administration and other details of the exercise with greater course integration. This involvement will increase as the user's resource base decreases and as his motives turn from (e.g.) data collection to (e.g.) enlightenment of the individual student, User involvement will also increase with lessened ability of students to learn. That is, the user will have to "work harder" with less able students than he will with more able students. Student involvement with the exercise is a function of the motivation levels, of course. Finally, the user's inventory of games and exercises will determine the decision variables within the game or exercise used.

## OBSERVATIONS FROM THE PROPOSITIONS

The enumeration of the several propositions tying the causes and effects of the model/theory together gives rise to a number of observations which should be made in passing.

1. The paramount consideration in the business concepts which are to be taught through the use of an exercise is the degree of theoretical nature (abstraction) of the concepts; it determines both the required degree of course integration and user involvement.

2. The primary concern with regard to the nature of the game or experiential used is the degree of course integration required by the concepts involved.

3. The degree of participant involvement with the game or experiential depends on a mixture of factors external (e.g., willingness of students to learn) to the exercise as well as factors internal (e.g. , administration) to the exercise or game.

4. Students' desire to learn rather than their ability to learn affects their involvement with the exercise or game.

5. Users should be cognizant that other games and exercises exist; that is, the user's choice set determines the decision variables in the exercise which affect the required course integration which ultimately affects user involvement.

6. Clearly, the most critical factor in the use of games and experientials is the degree of user involvement necessitated by or permitted by internal and situational factors. The success of the use of games and experientials seems highly dependent on the degree of user involvement with the exercise.

## CONCLUSIONS

As was indicated in the Introduction, the basic objective of the paper is to assemble into a logical system those variables which the authors believe to be critical in the use of games and experiential exercises. As such, it represents the necessary intermediate step between pretheory and the testing of hypotheses. Casting of the variables into causal models such as those described commences the process of theory reduction, or to be more specific, it focuses attention on the critical interactions within variable sets and relationships between variable sets.

The next logical step, it seems, is to solicit constructive comments from others who are working in this area or from those who are simply interested in the topic and are motivated to respond to some of our comments. To this end, we have disseminated the paper to individuals who have written and published papers on the conceptual and theoretical complexities involved with the use or design of games and experientials in a business setting. In the meantime, our desire for programmatic research in this area compels us to begin structuring operational definitions and formulating specific research hypotheses which will be tested empirically.

## REFERENCES

[1] Blalock, Hubert M., Jr., Theory Construction, Prentice-Hall, Englewood Cliffs, New Jersey, 1969.

[2] Burns, Alvin C. and James W. Gentry, Some Thoughts on a "Theory" of the Use of Games and Experiential Exercises, New Horizons in Simulation Games and Experiential Learning [Carl C. Nielson (ed)], Wichita Kansas: Department of Administration, Wichita State University, 1977, 187-194.

[3] Estes, James, What's in it for Me? Over, Under, and Around Using a Computerized Business Simulation, Journal of Experiential Learning and Simulation, 1:65-89 (1979).

[4] Parasuraman, A., A Framework for Determining the Pedagogical Value of Simulation Gaming: Implications for Future Simulation Gaming Research, in Exploring Experiential Learning: Simulations and Experiential Exercises (D. C. , Brenenstuhl and S. C. Certo, (eds.), Tempe, Arizona: Bureau of Business and Economic Research, Arizona State University, 1978. 127-132.