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A METHODOLOGY FOR ASSESSING THE INTERNAL VALIDITY OF BUSINESS SIMULATIONS

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INTRODUCTION AND PURPOSE

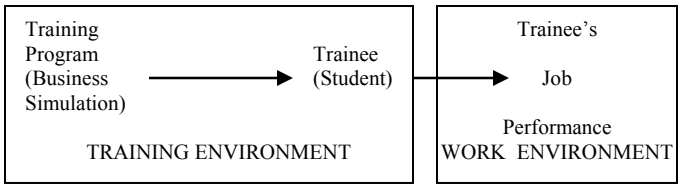
Business simulations and games are popular teaching methods in management education today. The formation of ASSEL and the volume of dollars spent (estimated to be $100,000,000 a year in 1975 by Neuhauser [11]) attest to this fact. However, the question of value i.e. "What do simulations and games do for the student?" continually make the user. The purpose of this piper is to provide a methodological fr4mework for more rigorously assessing the value of business simulations. To accomplish this objective, the paper will: I) discuss and use a training perspective as a starting point in design of assessment methods, 2) discuss the use of experimental research tools and their use in assessment, and 3) present a brief proposed application of the assessment framework.

THE TRAINING PERSPECTIVE

Since management education is for all practical purposes a training situation, the use of i simple conceptual representation of training provides a useful point of view for more rigorously designing and assessing business simulations. This model was developed specifically from .3. P. Campbell [21 and R. M. Gagne [4] and generally from Goldstein [61. Figure 1 portrays this simple training paradigm as applied to management education.

FIGURE 1

TRAINING AS APPLIED TO BUSINESS SIMULIATIONS
AS A LEARNING TOOL



The paradigm shows that within the training environment (the college of university) the trainee experiences a training program composed of training goals and training methods. Those skills obtained from the training program are then transferred to the work environment and used by the trainee to attain some level of successful job performance. The major objective of the training paradigm is to insure good job performance by providing appropriate and usable skills and attitudes that can be transferred to the work place.

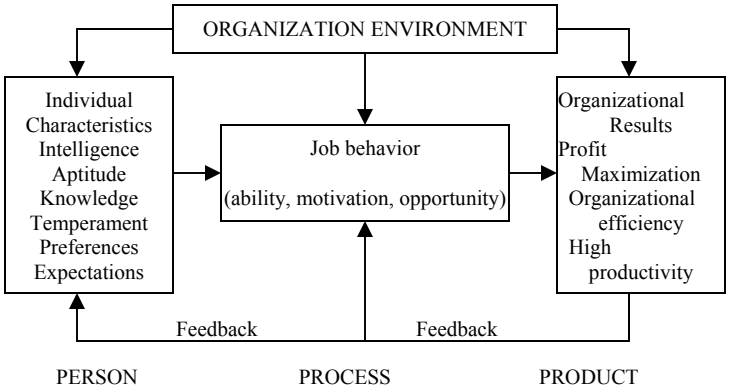
Designing a training system to achieve this god requires several steps. The first step must include in understanding of the forces (internal and external to the individual which produce good job performance. These forces must then be broken down into those which the individual his some reasonable control over and those that are for the most part uncontrollable.

Those forces in the controllable group then become the focus of the development of the training program,. The second step is then to develop the training program. Based on the assessment of the job success factors, training gods ire developed. From these training goals, methods are selected and specific activities are developed which are expected to achieve the training goals.

The final step in the training process is an assessment of the training program. Assessment can take place at two points in the training paradigm. Assessment can take place at the completion of the training program (still in the training environment) and on the job (the work environment). Both assessments are necessary for d successful training development program but for different reasons. The assessment completed in the training environment seeks to determine if the training methods selected And the specific activities developed, were successful in achieving the training goals. The assessment in the work environment seeks to determine the appropriateness of the training goals (and ultimately the analysis of the job performance factors-step one) and the transferability of the skills and attitudes of the training program to the actual job. Applying this training development process to business simulations first requires an assessment of the factors which cause good job performance by managers.

The conceptual model of Manager Effectiveness presented in Campbell et al [3] is probably the most comprehensive identification of factors which are related to and presumed to cause good job performance. Un- fortunately, its conceptual and comprehensive characteristic makes direct use of it difficult. However, it does provide a framework leading to factor groupings to be recognized in understanding managerial effectiveness. Shown below as Figure 2 is Campbell's model. The major elements include: i person (the manager) utilizing a process (job behavior) to attain a product (organizational results). Thus certain characteristics possessed by the successful manager coupled with certain behavioral factors lead to successful organizational results.

FIGURE 2
SCHEMATIC PORTRAYAL OF THE TETERMINERS OF
MANAGERIAL BEHAVIOR



Our interpretation of Campbell coupled with a recognition of the need to measure the factors leads us to the following simplification of the model. Factor categories to predict successful managers are: 1) job (technical) knowledge, 2) basic intelligence, 3) problem solving ability, 4) values and 5) traits. We are also indebted to the cited works of Mahoney [9, 10] and Ghiselli [5] in proposing these categories.

Clearly these variables represent varying degrees of controllability by the individual manager. Basic intelligence and traits seem to be a given for an individual manager. Job (technical) knowledge and problem solving abilities, and to a lesser degree values, would seem to be more controllable and thus teachable variables. These three categories should then become the basis for determining the educational goals of business simulations.

Schellenberger [14] calls the educational goals learning variables and notes three general categories. First , attitudes such as an administrative point of view or tolerance for ambiguity that are gained by game play The second category noted is knowledge. Knowledge refers to knowledge learned or enhanced by game play, such as sues forecasting (technical knowledge). The find learning variable category refers to skills. These are defined is integration and problem solving.

The next step in this application would be the selection of training methods and specific tasks. The assumed choice for method is, of course, a business simulation However, the tasks required by business simulations can vary widely, not only in number, but in complexity. Thus, the game builder must balance the game tasks against the training goals in construction of the business simulation (see Schellenberger [14] for a discussion of these tasks).

The find step is the assessment of the training value of the game. As specified earlier, assessment takes place at two points in the training paradigm. The first point is after the completion of the simulation experience. This point of assessment is often termed “internal validity” in the literature and this paper will define “internal validity” this way. The bulk of the assessment activity for business simulations and games has focused on this internal validity” question.

As several reviews have stated [7. 11, 13] little conclusive evidence has been gleaned from these activities. The second point of assessment occurs after the trainee has gone into the work environment. This assessment is usually termed “external validity.” Little effort seems to have been put forth in assessing “external validity” (see [12] for an exception) probably due to the difficulties involved in a longitudinal study of this type. In summary, the results of assessment activities for business simulations provides little support for their use as training methods. Thus, with this assessment, two hypotheses ire possible: 1) business simulations are not useful tools in management education, or 2) there are deficiencies in the application of the training program construction process to business simulations, Before the first hypothesis can be accepted, the second must be evaluated from t methodologically rigorous standpoint.

EXPERIMENTATION

Efforts to more rigorously evaluate the educational value of business games requires in experimentation approach in contrast to exploratory or descriptive methods. Kerlinger [81 views in experiment as:

> …a scientific investigation in which an investigator manipulates and controls one or more independent variables and observes the dependent variable or variables for variation concomitant to the manipulation of the independent variables.

Thus, the critical components of the experimental approach would appear to be: I) determination of the independent variables and dependent variables, 2) control of the independent variables, 3) manipulation of the independent variable or variables of interest (experimental variable/s) and 4) observation of the dependent variable or variables (criterion variable/s). At the “external validation" point of assessment, the dependent variable or variables would be those variables which define job success. At the “internal validation” assessment point, the dependent variables should be those which link with the job success variables. These dependent variables should be readily apparent in the training goals. Parasuraman [13] has stated that the implied goal of business simulations is to teach effective decision making. Thus, a prime candidate for the ‘internal validation criterion or dependent variable should be decision making ability.

Independent (experimental) variables in the business simulation assessment experiment would be those which have an impact on the dependent variable or variables and can be manipulated by the experimenter. These would be variables involved with the game itself. Some of the variables proposed by Schellenberger include: degree of reality, level of complexity, mode of administration, intensity and duration of play, administrator intervention, and instructor attitudes [14]. Note that not all variables that could have an impact on the criterion variable (decision making ability) ire considered as potential experimental variables. Those variables which can not be manipulated by the experimenter, such as basic intelligence, traits, and values, must be controlled. Without control, it is impossible to show causality in the assessment experiment.

The final task in the business simulation assessment experiment is observation or measurement of the dependent or criterion variable or variables. Thus, some method of measuring decision making abilities in the “internal validation” assessment or job success in the °external validation assessment point is necessary. Also of importance in this step, particularly for the “external validation” point, is time of observation or measurement. How long does it take for the individual’s characteristics and the work environment factors to interact to produce some level of job success?

A PROPOSED APPLICATION

Using the training program paradigm as a basis, t proposed experiment for assessing the value of business simulations will be presented. Although the major aim of business education is to increase the chances of job success in “external validation’ assessment task, the training program (business simulation) must be assessed first. If this “internal validity” assessment is not completed first, it would be impossible to determine if a negative ‘external validity” assessment finding was due to lack of acquiring the skills sought by the training program or the inability of the skills to be transferred to the work place. Thus, this proposed experiment is of the “internal validity" assessment type.

The experimental variable of interest in the proposed experiment is administrator intervention. Administrative intervention refers to all actions taken by the instructor to reinforce the learning goals. The Intervention variable will be manipulated by having a low intervention treatment and a high intervention treatment. The low intervention treatment will consist of a taped program lecture, trial decision, out-of-class central consultants, and a post game quiz. The high intervention will include the above activities plus a pre game quiz, required minimum purchases of market research, board of directors meetings, planning documents, sales and market share forecasting consul- tints, and post game critiques. The general hypothesis of the proposed study is that high intervention will result in higher levels of the criterion variable-decision making ability, than the low intervention treatment.

Other independent variables will be controlled in the following ways. Student groups will be matched on the basis of age, sex, major (accounting and non- accounting) and grade point average. Basic ability, traits, and values will be measured using standard instruments. Groups will be evaluated to determine if there are any significant differences between the treatments on these variables. The potential problem of hiving the nature of one particular business simulation as a training method will be controlled by using two complex games. The experimental design can then be represented by the following four cell matrix (Figure 3).

FIGURE 3
EXPERIMENTAL DESIGN

Intervention

	High	Low
Game A		
Game B		

A final possible moderating variable is the Instructor. To control this variable, each instructor will have one section with low intervention (using both games) and one with high intervention (using both games). As a final control, groups will compete only with like Intervention groups.

As with most research on management games, student interest, motivation, attitudes and perceptions of learning will be measured. Also, their understanding of certain concepts will be assessed. However, the major criterion or dependent variable of this proposed project will be decision making ability. Boseman and Schellenberger [15] have developed and used seven! short structured cases to assess decision making ability. These cases will be used to measure the major criterion variable Measurements will be taken near the end of the term. Analysis of variance will be used to test the hypothesis that high intervention groups in both business simulations will have better decision making abilities than those in the low intervention groups.

REFERENCES

[1] Boseman, Glen and Robert E. Schellenberger, 'Business Gaming: An Empirical Appraisal," Simulation and Games, Vol. 5, No. 4, 1974, pp. 383.402.

[2] Campbell, J. P. "Personal Training and Development," Annual Review of Psychology, 1971.

[3] Campbell, J. P., Dunnette, M. D. et al. Managerial Behavior Performance and Effectiveness. 1970, McGraw-Hill.

[4] Gagne, R. M. "Military Training and Principles of Learning," American Psychologist, 1962, Vol.17 pp. 83-91.

[5] Ghiselli, E. C. Explorations in Managerial Talent. 1971, Goodyear Publishing Company.

[6] Goldstein, Irwin J. Training: Program Development and Evaluation. (Monterey, California: Brooks/Cole, 1974).

[7] Greenlaw, Paul S. and F. Pail Wyman, 'The Teaching Effectiveness of Games in Collegiate Business Courses," Simulation and Games, Vol. 4, No. 3, 1973, pp. 259-294.

[8] Kerlinger, Fred N. Foundations of Behavioral Research. (New York: Holt, Rhinehart and Winston, 1973), p. 315.

[9] Mahoney, T. E. and Jerdee, T. H. et al, "Predicting Managerial Effectiveness," Personnel Psychology, 1960, 13, 81-98.

[10] Mahoney, T. E. and Jerdee, T. H. et al, Development of Managerial Performance: A Research Approach. Southwestern, 1963.

[11] Neuhauser, John J, , "Business Games Have Failed," Academy of Management Review, Vol. 1, 1976, pp. 124-128.

[12] Norris, Swight R., and Charles A. Snyder, "External Validation: An Experimental Approach to Determining the Worth of Simulation Games," in Proceedings, Eighth ABSEL Conference, 1981, pp. 24 7-250.

[13] Parasuraman, A., "Assessing the Worth of Business Games," Simulation and Games, Vol. 12, No. 2, 1981, pp. 189-200.

[14] Schellenberger, Robert E. , "Critical Variables in Research on the Educational Value of Management Games," Proceedings, Eighth ABSEL Conference, 1981, p. 70.

[15] Schellenberger, Robert E. and Boseman, F. G. Policy Formulation and Strategy Management, 1981, 2nd Edition, John Wiley and Sons.