THE DESIGN, CONDUCT AND EVALUATION OF A COMPUTERIZED
MANAGEMENT GAME AS A FORM OF EXPERIENTIAL LEARNING

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SOME INITIAL CONDITIONS

The course for which the simulation game is offered is a required, three—hour course given during the second semester of a calendar-yearlong MBA program. It follows a semester of required study in five functional areas of business. It is intended primarily as an integrative experience in which the student is able to obtain a broad yet penetrating perspective of the operation of the firm. Students are assumed to have already obtained the basic knowledge and skills of the functional disciplines; further depth in these cognitive areas is not a primary purpose of this course. Specific learning objectives have been specified by the faculty as follows:

1. Students will be able to demonstrate their capability in assuming a top management perspective for the effective administration of the total enterprise.

2. Students will be able to demonstrate their capability in effectively diagnosing and resolving complex business problems.

3. Students will be able to demonstrate their capability in observing and understanding the business enterprise both as a collection of differentiated parts and as a total, integrated system. Further, they will demonstrate awareness and consideration of the enterprise in interaction with its environment.

4. Students will be able to demonstrate their role effectiveness in working as a team member within a differentiated task team, especially with regard to readily providing and accepting the special skills, expertise, and information held by team members.

5. Students will be able to demonstrate their effectiveness in being aware of, seeking out, and making use of resources available in accomplishing their task responsibilities.

Consistent with the broader philosophy of the program, which encourages student choice and voluntary association, the simulation game is one of several alternatives for accomplishing these objectives.

SOME BASIC ASSUMPTIONS

Given the initial conditions related to the course, it is critical to understand the underlying philosophy with which we have approached the design and conduct of the game. This has significantly affected not only the choice of the game and the operational design, but also the style and behavior of the administrators. The general philosophy can be expressed

in the following assumptions about learning:

1. Learning is a life-long personal process. Any given course or learning process if but a concentrated segment in the individual's continuing learning and development process.

2. The underlying purpose of any course or learning process is the development and expansion of the competence (personal and professional) of the total person, and not simply the absorption of specific knowledge, facts and tools.

3. Substantive knowledge, gained by whatever means, is important, but it is incomplete until capabilities for integrating, internalizing, and using the knowledge are achieved.

4. Internal motivation is necessary for optimal learning. The most effective and lasting learning stems from a "need to know."

5. Responsibility for learning lies in the hands of the learner. The learner must "own" his learning choices and processes, assuming the initiative, direction and management of them.

6. The primary role of the teacher is to create experiences and conditions for learning and to guide the student through the learning process.

7. Self-assessment and self-evaluation are of primary importance. Feedback and evaluations by others are secondary but important as checks against broader realities.

8. The most important learning is learning how to learn — through multiple learning methods, but especially how to learn from one's own experience.

In these general assumptions we have clearly placed a great deal of emphasis on experiential learning. We have assumed that the richest learning stems from learning by <u>doing</u>. It is through this process that the student can operationalize and internalize as well as integrate the substantive knowledge he has gained.

From this perspective we have established some further assumptions with regard to the design of such learning experiences:

1. Individual students have different needs for learning, both with regard to the content and to the preferred method of learning.

2. The level of student motivation will be significantly impacted by his perception of what is relevant to him.

3. Alternative structures and methods of learning are required in order to provide the student some choice and to enhance the relative voluntary association with the learning design.

4. The establishment of learning and behavioral objectives are important to provide direction for learning and benchmarks for assessment.

5. Frequent and multiple sources of feedback and evaluation are especially important for experiential learning designs in order to enhance the breadth and depth of learning.

Given the course objectives stated earlier and the philosophy of learning represented above, we have gone a step further to establish some assumptions more specifically related to the design for a simulation game:

1. The more closely the learning process and environment parallel (simulate) actual practice, the more motivated the students will be and the more rich the learning potential.

2. The more the student embraces the experience as a <u>simulation</u> and not as a game, the more his learning will be enhanced.

3. The more complex, multi-faceted, flexible and interactive the game and learning environment, the more likely the student will perceive it as a simulation.

4. Flexibility and adaptability of the structure and mechanics of the simulation are crucial in order to provide both for close parallels with actual practice and for responsiveness to student initiatives and experimentations.

5. The purpose of the simulation game is learning and not winning. Winning in this context can most appropriately be defined in terms of the individual's learning needs and achievements.

Collectively, these assumptions and the course learning objectives have formed the context in which we have chosen, designed and conducted our simulation game. However, we have found it extremely important to clarify our understanding of the process of experiential learning in order to enhance the learning outcomes. It is to this we turn next.

A CONCEPTUAL FRAMEWORK FOR EXPERIENTIAL LEARNING

Many authors have worked to understand some or all of the processes by which people learn cognitively. Most notable among these efforts are the works of Jerome Bruner [1] and Jean Piaget [2], who have conceived of the learning process in terms of cognitive development. More recently William Torbert [3] and David Kolb [4] have developed more sophisticated conceptualizations specifically for how people learn from experience, interweaving the work of cognitive theorists and of proponents of the laboratory methods of learning (e.g., Schein and Bennis, [5]).

We have found Kolb's rather simple conceptual model of experiential learning to be particularly useful in understanding the way learning occurs in such experiences as a simulation game. The diagram in Figure 1 represents this four-phase cyclical model. The process of learning through experience is conceived as a repetitive cycle in which the learner first engages in some concrete experience. This leads to reflective observations on that experience from which the learner inductively derives abstract concepts and generalizations. Once formed, these conceptualizations lead deductively to new hypotheses and actions which will
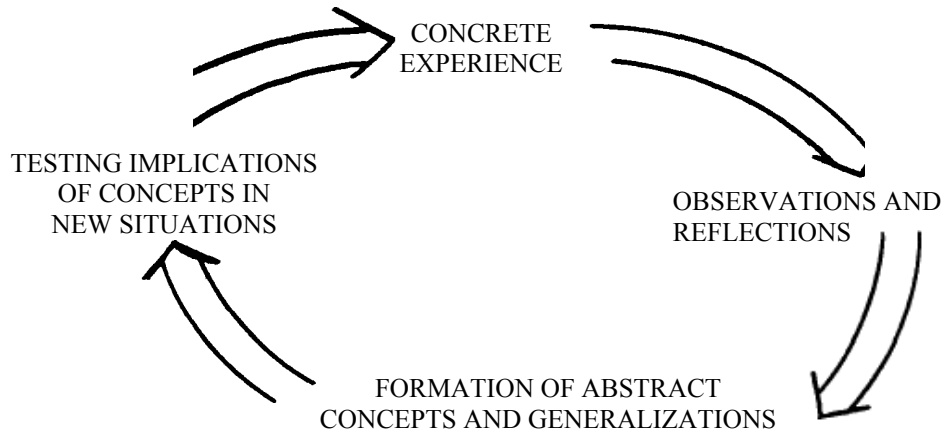
CONCRETE
EXPERIENCE

TESTING IMPLICATIONS
OF CONCEPTS IN
NEW SITUATIONS

OBSERVATIONS AND
REFLECTIONS

FORMATION OF ABSTRACT
CONCEPTS AND GENERALIZATIONS

Fig. l. --The Experiential Learning Model

test their implications, and the new actions lead to new concrete experiences which initiate the cycle again. By examining the ways in which different learners place emphasis on one or two of these phases of learning Kolb has been able to discover variations in learning styles.

The implications of this conceptualization of the experiential learning process for the design and conduct of a simulation game are numerous. The predictable presence of a variety and variable learning styles among participants suggests a need for equal variety and variability in the learning design. It also suggests that given the same relative experience and conditions different students are likely to react differently and even learn different things. And where the student's learning style is in contradiction with the learning setting, it is likely that learning will be minimized if not rejected altogether.

CHALLENGES FOR THE DESIGN AND CONDUCT OF A SIMULATION GAME

The foregoing conceptualization of the learning process and the assumptions discussed earlier have set the operational and conceptual context for the design and conduct of our simulation game. With the specified learning objectives in mind, we have attempted to draw from this context a set of challenges which must be met to provide an effective and enriched learning experience. These challenges not only give direction to the selection, design and conduct of the simulation game, but they also provide operational criteria for evaluating our on-going efforts. The following are the specific challenges we have established:

1. Can we locate, adapt, or develop a simulation game that contains all of the major elements of the management of the total enterprise and that closely parallels actual practice?

2. Does the game contain sufficient complexity and variability to ensure that participants will experience it as a simulation and

not simply as a game?

3. Does the game include simulation of all of the major environmental factors for the firm, as well as the internal decision making and planning?

4. Can the environmental factors be designed to utilize external resources in the same roles, standards and behaviors they use in actual practice?

5. Can the entire learning environment be designed with sufficient flexibility and responsiveness to be largely self-maintaining and self-renewing?

6. Can the learning environment be created to emphasize winning-by-learning rather than learning-by-winning, where every participant clearly has the opportunity to learn and achieve, and cometition is seen as an aspect of the simulated marketplace.

7. Can the learning environment provide frequent and multiple sources and kinds of feedback to meet individual needs and styles?

8. Does the simulation provide sufficient flexibility and variability to allow participants to discover and actualize their individual learning needs and styles?

9. Can the learning environment be designed to establish and help to retain the view of game administrators as facilitators of learning and learning resources, rather than as instructors of content materials?

10. Can the learning environment provide for the simultaneous attainment of the multiple objectives for the course and the means for assessing the extent to which the individuals have met them?

Our experience suggests that these are difficult challenges to meet. Some of them require a great deal of skill and awareness in implementation as well as care in their design. Some of them violate roles and expectations of faculty, students and outside resources alike. All of them require a substantial amount of care and precision in design and preparation and continuous attention during the conduct of the game.

MEETING THE CHALLENGES

After extensive consideration of these challenges we selected the MANAGEMENT GAME developed at New York University. This game is an outgrowth of the CARNEGIE-TECH MANAGEMENT GAME which has been extensively adapted and elaborated both at NYU and SMU. Uretsky [6] has provided a rather complete description of the design and conduct of the game. While we have made a number of changes to it, the basic design and structure of the game is essentially the same as he describes it.

There are two especially important features of this game. First, it

contains a considerable amount of complexity in the number and inclusiveness of the decisions the participants must make. This complexity and the interconnections between decisions contained in the simulation program provide a close parallel to actual practice. Second, a significant part of the game is derived from the actual involvement with the surrounding business community. Each firm reports to a Board of Directors comprised of leading members of the Dallas business community. Debt financing is obtained through negotiations with members of local Dallas banks, while equity capital is obtained through negotiations with a local underwriting firm, and so on.

The inclusion of actual practitioners in their actual roles as a means for simulating the firms' environment provides additional reality and complexity. This is probably the most important design feature of the game and requires more attention during conduct of the game than any other feature. At an initial meeting of all the external participants heavy emphasis is given to the fact that each is being asked to behave in accustomed ways. Board members are expected to apply the same standards to meetings of the game boards as they apply to the directorships each holds in actual practice. This feature alone suggests to students that they are going to be involved in seeing a piece of actual practice and seeing businessmen in their true character.

Perhaps equally important is that the design should produce a simulation that is self-maintaining and self-renewing. We have met this challenge by acting to maintain the idea that students are simulating reality and that their simulation results are not governed by the application of arbitrary rules. A game committee meets regularly to review requests for changes to the conduct of the simulation, using parallels with actual practice as the primary criterion for approving requests.

A further application of the reality criterion centers around the evaluation issue, sometimes the reason why simulation becomes a "game." We permit each firm to work out the objectives for the firm with each other and the board of directors. No pre-specified objectives are given or sought. This feature also motivates the students by offering additional realism and the opportunity to seek out responsibilities that meet their individual learning needs.

The use of external participants provides numerous opportunities for feedback and is one of the main characteristics of the meetings of the boards of directors. We have witnessed numerous instances where boards have refused to approve dividends, proposed plant expansion, additional expenditures for research and development or the acquisition of additional debt. We have also made it a point to meet regularly with the presidents of each firm and to attend planning or decision meetings of the firms. These meetings provide the most opportune moments for giving feedback on learning styles.

The extensive use of external participants in their actual roles, the reality and complexity of the game, the existence of numerous sources of feedback and the use of the simulation as the only activity in this three-semester-hour course provides the basis for establishing and retaining the view that the faculty coordinators are learning resources rather than instructors in content.

The six objectives for the course and the thirteen skills and attitudes measured were individually classified according to whether they represented cognitive or non-cognitive learning. In this instance cognition refers primarily to content learning while non-cognitive refers to learning in the areas of self-directedness, responsibility for one's own learning, the identification and acquisition of different learning styles and the gaining of top-level perspectives on the field of managing a complex system.

Analysis of the data reveals that, on the average:

1. students report similar preference for cognitive vs. non-cognitive objectives and each is highly rated by students;

2. students report the same degree of cognitive and non-cognitive learning and the amount of learning for each dimension is high;

3. both cognitive and non-cognitive learning have increased significantly from the first year to the second year use of the game; and

4. students reported more of both cognitive and non-cognitive learning in the simulation section than the case-method section of the course. These results are in contrast to the results found by researching the educational effects of business games [7,8]. These studies have tended to suggest that simulations are not very efficient content acquisition methods where the content is prespecified and that many of the supposed no-cognitive learnings simply do not exist [7].

Some of our results are consistent with the extensive research conducted by the staff of the Center for Social Organization of Schools at the Johns Hopkins University [9]. This study concludes that simulation games can teach factual information though not more effectively than other methods. This finding is not consistent with our own. The Hopkins study also concludes, among other things, (1) simulations can improve student's ability to perform tasks similar to those in the simulation, (2) neither unstructured role-playing nor highly abstract simulations are as effective as a more concrete simulation where the identification of roles is explicit and (3) the amount of time students spend in the simulation can make a substantial difference in the effects [9, p.27]. Each of these findings is consistent with our own results or assumptions.

Although no single factor can be identified as we seek to causally link learning and the simulation course it is appropriate to note here that (1) the students continually rate their association with board members as the single, most important factor in their learning and (2) the students were allowed to choose among two major ways to satisfy the course requirements, namely the simulation sections or the case section or a self-designed program. This voluntary association with the simulation and our own improved efforts to act to support the idea that we are attempting to simulate reality are considered major factors in the results to date.

In conducting our survey of student reported learning in the second year we also refined our questionnaire to include identification of the major task area of the responder. The task areas of respondents were classified into (1) presidents (2) marketing executives (3) finance executives and (4) other executives — such as personnel, production or accounting.

Although there were some differences between reported learning in the two industries by task areas, on the average:

1. presidents reported more cognitive and non-cognitive learning than any other task area respondent,

2. finance and marketing executives reported high cognitive and non-cognitive learning but less than the presidents, and

3. all other task areas reported the least cognitive and non-cognitive learning.

These findings are relatively predictable because the coordinators spend a great deal of time with the presidents as does the board. The marketing executives spend more time with the coordinators than do the finance executives, and each spends about equal time with the board, but finance characteristically has a lot of time with external participants in banking. The least time of the coordinators and the external participants is given to such functions as production, personnel and accounting.

Another important factor in the relatively higher reported learning of presidents is the fact that each president requests the job. This can be seen as attesting to their high level of interest and motivation in the learning opportunities offered by the simulation.

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