MOTIVATING SIMULATION GAME PERFORMANCE AND SATISFACTION WITH GROUP PERFORMANCE-CONTINGENT CONSEQUENCES

Richard M. Hodgetts
Management Department
University of Nebraska-Lincoln

and

Robert Kreitner
Department of Management Sciences
Western Illinois University

INTRODUCTION

The development of a simulation game, with all the appropriate hardware and software considerations, is only the first step in realizing its full potential. Ultimate effective utilization depends upon the solution of some behavioral problems in addition to the usual technical problems. Once developed, adapted to curriculum constraints, and put into play, the game administrator's attention must then turn to motivational problems. Students possessing a wide range of abilities and motivational states must actively play the game if key concepts and skills are to be learned as intended. What is frequently needed is an efficient way of motivating effective simulation game performance. A dearth of empirical research presently exists on this important aspect of business gaming. Too often in business gaming, intrinsic motivation, associated with the satisfaction of mastering a unique and complex task, wanes as the game progresses, particularly when the game is spread over a prolonged period of time such as a semester. Consequently, individual involvement in group decision making and commitment to collective objectives must be extrinsically motivated when intrinsic motivation fades. This paper reports an experimental attempt to stimulate performance and satisfaction in a business management simulation through the use of group performance-contingent consequences.

RESEARCH METHODOLOGY

Every semester at the University of Nebraska-Lincoln, undergraduate students in the Principles of Management class are required to play Top Management Simulation (TMS), an interactive business simulation of medium complexity. The purpose of the game is to expose the students to a relatively realistic management setting in which they can develop problem solving skills. Each team consists of six to ten people with eight teams forming an economy. The teams in each economy compete against one another in an industrial goods manufacturing industry. Four practice decisions are followed by eight "real" quarters of play. This works out to one quarterly decision per week during a semester. Team decision making encompasses pricing, plant capacity, unit production, selling effort, advertising, and research and development.

The subjects (n=255) in this study were drawn from a population of 437 undergraduate management principles students. They were randomly assigned to economies and teams. There were five economies in the study: four experimental and one control. All were naive participants in that they did not volunteer for the study and were not informed of the reasons for the scoring techniques employed. An a posteriori analysis uncovered no significant differences at the .05 level between the experimental and control group team members for nine relevant demographic variables.

Team members in the experimental group were told that they would be playing the game subject to two contingency management strategies: one covering superior ranking and another covering competitive activity. First, after each quarter of play, the team with the highest cumulative return on investment (ROI), which was simply a running total of quarterly profits divided be assets, would be given 3 bonus points; the one with the second highest ROI would receive 2 bonus points; the team with the third ranking ROI would get 1 bonus point. With the cumulative feature, a team could have the highest quarterly ROI but fail to be ranked first due to poor prior quarters. Relative to the second contingency, after each quarter of play teams which improved their cumulative ROI rankings were given 2 bonus points for each place advanced. A further incentive for upward movement in the competitive ROI standings was a 1 point penalty for each place declined.

As a procedural note, the quarterly ROI figures were weighted prior to cumulative ranking to benefit "late starters." In Quarter One the weight was 1 and subsequently it was increased by an increment of .2 per quarter. The weights were applied equally regardless of standing. This weighting procedure gave teams that had experienced a bad quarter or two early in the game the opportunity to remain competitive later in the game.

The reinforcing quality of the bonus points was established by telling the students that each team member's final class point accumulation would be supplemented by an amount equal to the points earned by his/her TMS team. Thus, individual team members were to be rewarded on the basis of collective performance. However, in no case would a team member's class point accumulation be reduced if his/her team finished with a negative bonus point total, which was possible. These were truly <u>bonus</u> points because they did not come out of the course grade base; they were to be granted in addition to the grade base points. The potency of the bonus points was further enhanced by publicly posting a bonus point score sheet after each weekly round of decisions. This procedure provided a prompt set of conditioned positive reinforcers to encourage continued active play.

RESULTS

As the game progressed, competitive activity, especially among the lagging experimental group teams during the last half of the game, exceeded that of the equivalent control group teams (see Table 1). A combination positive reinforcement/punishment contingency management strategy appeared to have effectively churned the competitive standings in the experimental group. Such competitive activity, assumed to be the result of active play, had been noticeably absent in prior TMS experience. Eighth place, for example, was occupied by at least two teams during the last four quarters in each experimental group economy. In contrast, eighth place in the control economy was occupied by only one team during the last four quarters.

As mentioned, it was among the bottom five teams that the TMS administrators had noticed, in TMS experiences prior to this study, a marked lack of competitive activity during the last half of each simulation period. The favorable results in this portion of the study suggest that competitive activity in *a* management simulation may be stimulated through the appropriate and systematic use of extrinsic rewards and punishers. With the experimental group contingency management strategies the TMS players always had an incentive for improving their team's performance. Even eighth placed teams, late in the game, could earn bonus class points by moving to seventh place or higher.

In addition to competitive activity, two other closely related dependent variables were measured in the study. The first was labeled TMS satisfaction. This dimension was measured by three items on a survey administered between the seventh and eighth regular decisions. An eighty-nine percent response rate was obtained. Table 2 indicates that although the experimental group subjects expressed greater satisfaction with the TMS than their control group counterparts, the difference was not statistically significant. A statistically significant difference was obtained, however, when satisfaction with the scoring plan was measured by three other items on the survey. In spite of the possibility of being contingently punished for declines in ranking, the experimental group subjects expressed significantly greater satisfaction with the contingent payoff plan than did the control group subjects with their noncontingent plan (see Table 2).

CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

The authors are the first to admit that differential competitive activity along with

TABLE 1

Competitive Activity Among Bottom Five Teams During Last Four Quarters of Play
(Activity Index A/I)

	Experimental group																				Control group				
	Economy 1 ROI rank by quarter					Economy 2 ROI rank by quarter					Economy 3 ROI rank by quarter					Economy 4 ROI rank by quarter					Economy 5 ROI rank by quarter				
	Qtr 5	Qtr 6	Qtr 7	Qtr 8	A/I	Qtr 5	Qtr 6	Qtr 7	Qtr 8	A/I	Qtr 5	Qtr 6	Qtr 7	Qtr 8	A/I	Qtr 5	Qtr 6	Qtr 7	Qtr 8	A/I	Qtr 5	Qtr 6	Qtr 7	Qtr 8	A/I
Team 1	5	3*	2	3	+2	6	6	6	7		2	5	5	5		7	8	7*	6*	+2	5	6	7	7	
2	7	7	6*	8	+1	5	2*	3	2	+3	6	6	6	6		8	7*	8	7*	+2	7	7	6*	6	+1
3	8	8	8	6*	+2	3	4	5	5		4	1*	1	2	+3	5	5	4*	3*	+2	2	1	2	3	
4	3	4	7	7		7	8	8	8		7	8	7*	7	+1	1	1	1	1		3	3	3	2	
5	6	6	5*	5	+1	1	3	2	3		5	2*	2	1	+3	2	2	3	8		6	5*	5	5	+1
6	1	1	1	1		8	7*	7	6*	+2	1	3	3	3		4	3*	2	2	+1	1	2	1	1	
7	2	2	4	2*	+2	2	5	4*	4	+1	3	4	4	4		6	4*	6	5*	+3	4	4	4	4	
8	4	5	3*	4	+2	4	1*	1	1	+3	8	7*	8	8	+1	3	6	5*	4*	+2	8	8	8	8	
					+10					+9					+8					+12					+2

*activity index criterion satisfied.
(one point per position advanced by 4th - 8th ranked teams)

TABLE 2

Inter-Group Comparisons of
Additional Dependent Variables

Variable	Group means: Experimental group	Group means: Control group	Inter-group comparison (t-scores)
TMS Satisfaction (task)	1.61	1.48	.718
Scoring Plan Satisfaction (reward)	1.49	.848	3.6* df = 38

*significant at the .05 level (one-tailed test)

increased task arid reward satisfaction are not tantamount to greater skill acquisition. But it is felt that valuable skills will be acquired only if students actively play a management simulation. As far as active pursuit and interest are concerned, programmed extrinsic consequences have been shown in this study to possess some practical utility. The formula is relatively simple: induce competitive activity and satisfaction with a system of programmed consequences and the learning effect, in turn, will be enhanced by the heightened involvement and greater commitment to group objectives. The results of this study are positive enough to warrant further experimentation in other simulation situations with various individual and group incentive plans.

The following list of variations and improvements on the reported study are suggested as a guide for subsequent experimentation.

1. The roles of the problem-solving group participants could be spelled out more clearly in advance to increase the probability of goal-directed behavior.

2. Initially, at least, multiple contingency management strategies such as the one employed in the reported study should be avoided until more precise results are obtained with single strategies.

3. To further facilitate goal-directed behavior on the part of simulation group members, a peer evaluation procedure with commensurate rewards for superior evaluation could be put into effect. Preliminary investigation by the authors with this procedure has had encouraging results.

The fundamental point of this research effort emerges clearly: there is more to general management simulations than their initial technical development, they must be actively played if they are to facilitate learning of problem-solving and related skills. As the reported study suggests, the appropriate use of programmed consequences shows promise for stimulating such activity. Conceivably, each simulation administrator will have to custom build his/her own contingency management plan to fit task, human, administrative, technical, and other situational variables.