

Developments in Business Simulation & Experiential Exercises, Volume 12, 1985

ADVANTAGES OF A MULTIGAME SIMULATION COURSE

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ABSTRACT

A simulation course in which many games are played over the course of a semester is described and contrasted with the more typical simulation, experience of playing one game over an extended period as part of another course. Experience with the course is described and the advantages perceived from the multi-game experience are discussed.

INTRODUCTION

ABSEL meetings have well documented the extensive use of simulation gaming in business school curricula. In most cases the student plays one large game for a substantial part of the term as part of another course such as a marketing course, a production course, or a business policy course. At our university, we have had a separate simulation course for some 25 years and over this time have experimented with a variety of methods of running the course. These methods have ranged from the original hand-umpired games, through complex games that took a whole semester to run, to our present orientation of using microcomputers exclusively for umpiring the games and concentrating on a variety of relatively small (although not necessarily simple) games.

Many of the individual games used in the course have been detailed at previous ABSEL meetings. However, the full course has not been described and the advantages of the multi-game format have not been presented in One place.

THE COURSE

The management simulation course is scheduled for two two-hour laboratory periods a week and is open to junior and senior students only. It is an elective course and is elected by large numbers of engineering and science students as well as by management students, with some 200 to 300 students taking the course each semester. Facilities used are a fifty-seat classroom and a simulation laboratory, consisting of seven team rooms and an umpire room with fairly complete sound, video, telephone, computer, and one-way mirror observation facilities. We also have video display monitors to show computer output directly to the class and use these for games run in the classroom. Section sizes are limited to forty students, both to ensure that everyone will be able to read the output on these monitors, and to keep the team size to not over six for games played in the team rooms of the simulation laboratory.

Students are given detailed write-ups of the games at the beginning of the semester and can do as much preparation as they want ahead of time. They are not told what team they will be on, and preparation is thus necessarily done on an individual basis. Homework assignments for the course consist largely of preparing for the games to be played, and students quickly learn how important preparation is.

Most games are played in the simulation laboratory. The students first gather in the classroom to receive their team assignments and to clear up any last minute questions.

Teams then go to their individual rooms and have 30 minutes before the first decision is due. During this time they have to find out who has what ideas about the strategy for the game, plan a strategy to be followed for the entire game, organize to make calculations necessary for future decisions, and make decisions for the first quarter. Results are returned within two minutes after decisions are in, and decisions for succeeding quarters are due at 10 minute intervals, giving time for a total of 7 quarters to be played, with the final decision due some 90 minutes after the class began. Students then return to the classroom where final results are delivered showing who won and the order of finish and leaving some 20 minutes for debriefing, discussion of the game, and any necessary introduction of the next game.

Some games are played in the classroom with video monitors showing computer output directly to the students. These games are started up similarly to the games played in the lab but team size is kept down to three and decisions are expected much quicker, usually in reaction to computer generated data, with up to 52 quarters of play run in the same single laboratory period.

Student Games

Another feature of the course is that students form five teams to develop student games to be played at the end of the term. Each team must come up with an idea for a game, develop the relationships to be used, program the game in BASIC, test the game, do a write-up complete with sample calculations for the rest of the class, and run the game. Some games are better than others, but students almost unanimously say that even though it is a lot of work, the opportunity to take their own idea and develop it through running the game and watching others play it is most worthwhile. In addition to giving students an opportunity to observe others playing their game, we usually have each student observe others playing an earlier game.

Grading

Our grading system calls for giving 30 percent of the grade based on the student's individual record of finishes. Because students are on different teams for each game, each student has a record of finishes that is unique to that student. Another 30 percent of the grade is based on a subjective evaluation of the student's performance by the faculty member teaching the course. Peer ratings make up another 20 percent of the grade. Students get to know one another very well in the course and I have been quite impressed with the sincere job they appear to do in the peer ratings. The final 20 percent of the grade is based on the student game with individuals being rated on the quality of the game their team developed and on their individual contribution to the development of the game. Because missed classes cannot be made up, grades are lowered appreciably for unexcused absences. These procedures only give an overall ranking of the class and actual grades are assigned based on these rankings using the standards currently in vogue at the university.

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TYPES OF GAMES

We have several different types of games being used in the course, with different situations portrayed within each type. Although some games are difficult to classify, three identifiable types stand out.

Management Science Games

The first type can be identified as management science games, games in which one team's results are not affected by the decisions of other teams. These games usually use the random number generating power of the computer to provide a different problem for each decision period, and these games are often played in the classroom with problem data and/or results being shown on the monitors, permitting fast moving games. Examples of these games are the INVENTORY game and the BANKRUPT game. In the INVENTORY game each team tries to minimize the sum of carrying costs, ordering costs, and stockout costs by deciding when to order and how much to order in the face of an uncertain demand. This game is played for 52 weeks, with a decision of whether to order required each week. In the BANKRUPT game, decisions about how much investment to make in plant, and what price to charge, are made each quarter, in a situation where demand is known to cycle up and down, but with the actual size of the changes unknown. This game is typically played for 15 quarters.

Examples of management science games played in the simulation laboratory are the PRODUCT MIX game and the REPLACE game. The PRODUCT MIX game is a linear programming game in which teams must decide, from randomly generated data, which suppliers to buy from in order to meet specifications for a product at the lowest cost. This game is quite complicated and is usually played for only five quarters. The REPLACE game requires decisions about what equipment to buy, when to buy it, and when to replace it in order to get the most after-tax profit. This game is also fairly complicated but requires some continued play so we push hard and get in 10 decisions within the two-hour time frame.

Interdependent Games

The second type of game is the interdependent type, to which a team's results are affected by the decisions made by other teams. Most price-production games fall into this category, where a team's sales are a function not only of the price they charge, but also a function of the prices charged by other teams. Several of the simple beginning games we use are in this category while examples of advanced games of this type are BREAKEVEN ANALYSIS and NETWORK ADVERTISING. In BREAKEVEN ANALYSIS, teams must not only decide on a price and how much to produce in the face of a demand function that is quite sensitive to the prices charged by other teams, but must also decide how much investment in plant to make, giving higher fixed cost in return for lower variable cost. In NETWORK ADVERTISING, teams must decide what fraction of their limited advertising hours should be devoted to promoting their own programs when the price received for advertising hours is a function of the viewers they secure and the viewers are a function of their promotional hours in relation to other team's promotional hours. Both these games are usually played for the standard seven quarters.

Negotiation Games

The third type of game is the negotiation type, in which the important decisions are the results of deals made between

competing teams. These games are necessarily quite time consuming and we occasionally devote two periods to one game in order to let the interactions develop more fully. Examples are MANUFACTURERS AND RETAILERS and COMPARATIVE ADVANTAGE. In MANUFACTURERS AND RETAILERS some teams are manufacturers and some teams are retailers. Manufacturers can sell only to retailers and retailers can only secure product from manufacturers. The pressures to deal are strong as a result, but who to deal with and how many to buy or sell at what price are all matters to be negotiated. In COMPARATIVE ADVANTAGE each team represents a country whose efficiency in producing different products is different from the efficiencies of the other countries, even though overall all countries are equal and all products are equal. To secure a high standard of living, consumption of all products must be equal, meaning that there is considerable pressure to buy one's least efficient products and sell one's most efficient products with the decisions being who to buy what product from and how many at what price.

ADVANTAGES OF THE MULTIGAME FORMAT

Management as a discipline is characterized by the necessity for combining analytical and behavioral concepts, and the successful manager is nearly always a person who has one foot firmly planted in each of these two diverse areas of expertise. Experiential learning in any form will usually do a better job of combining these areas than traditional learning, and our multigame format makes important contributions in both of these areas. Particular advantages are discussed below under each of these categories but it should be remembered that it is the combination of the two that is particularly valuable.

Analytical Concepts

Within the heading of analytical concepts, important advantages are to be found under the general headings of indoctrination, dominant variables, different concepts, and different types of games.

Indoctrination should really be called avoidance of indoctrination. Very early in my experience with simulation gaming I became concerned about the typical student's propensity to learn the wrong things from a game, and while we can attempt to overcome this through fairly exhaustive debriefing, I believe that a counter example brings the point home even more forcefully. Examples of this are illustrated by some simple points brought out in our early price-production games. In one of the early games we have an inventory carrying charge of \$2 per unit per quarter. In this game the demand structure and cost relationships are such that the game usually runs with teams operating on about a \$1 per unit margin. Students quickly learn that inventory costs can destroy their profits and work hard at keeping their inventory low, even if this means a considerable amount of stockouts. In a succeeding game we again use a \$2 per unit per quarter inventory carrying charge but the demand and cost functions are structured to give about a \$20 per unit margin. All too often the lesson learned in the previous game is that inventory is expensive, and teams following this precept try to keep their inventory costs to a minimum and routinely stock out, losing the opportunity for significant gains that greatly overshadow the additional costs. Pointing out that the desirability of having inventory must be judged by the conditions rather than by only attitudes seems to be considerably more effective than making the same point after only one experience. A similar point is made concerning pricing. We will try to have one game where the

Developments in Business Simulation & Experiential Exercises, Volume 12, 1985

winning strategy incorporates a high price-low volume philosophy and follow that up with a game where low price-high volume carries the day. In both cases the message is that analysis of the situation is critical rather than depending on acquired attitudes.

The question of dominant variables in a game design is a related topic to the indoctrination concept. When a game is designed to be played over a fairly long period of calendar time, game designers will usually try to avoid having one team win the game irretrievably in the first quarter or two. The result is that teams will often content themselves with making conservative, middle-of-the-road decisions in the early quarters while waiting to see how the game develops. This can easily become a learned behavior pattern, and I much prefer to have only some games where this is the winning approach while others have dominant variables in them that will let teams effectively win the game in the first quarter or two. I believe that there are many dominant variables in real world situations, and in the first half hour of planning strategy for a game I much prefer to hear students asking "what do you think is the most important factor in this game?" rather than taking the conservative approach of treating all variables as equally important.

The multiplicity of different concepts that can be not only covered but stressed in the multigame format represents another advantage. While the single large game can cover a wide variety of concepts, all too often the effect of any one concept may be buried in the wide variety of concepts being covered by the same results. As an example of what individual games can accomplish, the INVENTORY game will have an appreciable number of students who will have covered economic lot quantity theory in other courses, who will recognize that the conditions match up reasonably well with the assumptions behind the theory, and who will use the formula very effectively. By the end of the game teams that have used values widely different from the formula value will have had a bad experience with them and will have adjusted to using lot sizes very close to the formula values. Concentrating on one basic problem as this game does means that a concept such as economic lot quantities is very clear and the advantages of making use of the theory are plain to all. It should also be pointed out that an order point analysis must be done for this game and that the conditions of the game do not well suit the presentation usually found in a beginning production book, so that the formulas really cannot be used. Some find this quite frustrating, but most accept that conditions do not always match textbook theory. Among the concepts that are covered as one of the main parts of a game are statistical inference, replacement theory, time value of money, price elasticity, marginal analysis, and linear programming.

Another feature of the multigame format is the opportunity to play different types of games. Some students who do very well in the management science games find that they are not nearly as comfortable with the necessity of trying to judge what other teams are likely to do in the interdependent games. Conversely, there are others who do much better in making this sort of judgment than they do in the more straightforward type. This feature is even more pronounced in the negotiation games where some students really blossom forth while others, often those who are the stars of the management science games, just do not do well at all. This can be a truly rewarding experience for those who were not particularly aware of what their particular skills were. In a recent term one of our star athletes was in the course and was only an average to below average performer until the first negotiation game. Here he really took over and led his team to victory. In the next negotiation game he once again did the same thing and we couldn't resist asking him if he had any experience selling used cars. He said "no" but that he was convinced that if he had he'd have been damn good at it.

Behavioral Concepts

Within the heading of behavioral concepts, important advantages are to be found under the headings of leadership opportunities, effective teamwork, and acquired reputation.

The multiple leadership opportunities that are presented to the student through playing many games is probably the single most important contribution of the multigame course. Many students with good ideas do not know how to present them to a group effectively, and often they are not aware of this before they find that their ideas are not being followed. We do as much to help in the way of giving advice as we can, but the chief contributor to a noticeable improvement in many students over the semester appears to be the many different leadership opportunities with many different groups. Some people appear to naturally prefer the non-leading role and it is always interesting to observe a group of these same types on a team with no one to take charge. These teams often do very well in the game and we find they tend to speak up more freely in future games. Observing other teams from behind the one-way mirrors helps, and discussions of the importance of body language, the importance of being prepared with calculations on paper (especially computer output) all make a contribution, but just providing the multiple opportunities appears to be the most important.

Learning effective teamwork is a related concept, but somewhat different, in that students begin to see that having an entire team of aspiring leaders all fighting for their own point of view usually results in a team doing poorly in a game. Dissension on a team almost always gives a poor result, and that happy compromise between effective presentation of ideas and merely striving for a leadership position is often difficult to achieve. Many of the games require some calculations each quarter after the results are returned, and organizing to see that these get done and shared with the team is important. In early games, teams often concentrate on the most interesting variable (often price) and do poorly because not enough attention was paid to a less interesting one, such as production. The essence of experiential learning is learning through experience, and concepts such as learning effective teamwork need repeated exposure.

A particularly realistic feature of the multigame format is that individuals do acquire a reputation during the course. In early games personality would appear to be the dominant factor in determining a leader, but as more games are played those whose ideas would have given better results had they been followed are recognized as people worth listening to, and their opinions are given extra weight. Similarly, those who confidently take over and lead their teams to last place finishes find that leading becomes far more difficult. The importance of good preparation and solid self-evaluation become evident to nearly all. I was particularly pleased with a comment of one student on our course evaluation at the end of the term who said "I learned to speak up when I knew what I was talking about and to keep my mouth shut when I didn't."