ADMINISTRATION: THE KEY TO A SUCCESSFUL GAMING EXPERIENCE

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There are two aspects to the problem of developing and using games in education; the design of the game model including the incorporation of programming innovations and the design of the operating system to be used in the play of the games. Most of us, who use games, have had some interest in programming and have used computers in other aspects of our courses. However, many faculty members have been reluctant to become involved with either computers or computer games. Part of this reluctance may be due to their lack of computer knowledge and part may be due to the many administrative problems that they have observed surrounding the operation of a computer game.

Whether this reluctance is justified or not, it is probably due to the failure of research studies to demonstrate the value of computer games in the educational process and the individual's desire to devote time to other activities. While many studies have considered the value of computer games, the results have not provided the necessary data to support the claims for their value. I would hope that we will soon have additional research to support the value of games in various aspects of the educational process.

In terms of faculty time, it appears to be a fact of the times that faculty must justify their value and they choose to do this in areas which are most familiar and most likely to provide the desired return. Unfortunately, this has caused many to ignore the possible value of using games in their classes unless they also are devoting research time to developing game models.

This paper is concerned with administrative improvements that can be made to increase the usefulness of computer games and, at the same time, reduce the excessive demands upon faculty time. Three areas are considered: (1) changes to meet course objectives, (2) changes to improve administrative efficiency, and (3) changes to increase student involvement.

ADAPTING THE GAME TO COURSE REQUIREMENTS

The administrator's first problem concerning the use of a game in his course is to select the game to be used. While many games are available, it is often necessary to accept a game which does not satisfy all requirements. Four factors appear to be most important in considering a game: (1) the purpose of the game, (2) the game environment, (3) the complexity of the game and game decisions, and (4) the balance between realism and the cost and ease of operating the game.

The Purpose of Games

My reason for using games is that they provide a classroom situation which cannot be provided through cases or other teaching methods. A game

provides a dynamic decision situation rather than a static one, such as a case. Like role playing, it requires decisions rather than simply the analysis of someone else's decisions. It is a method of placing students in a managerial role without providing an actual business venture to operate. In terms of another college game, a business game approximates the Monday morning critique. I would not suggest that the game can provide all of the business experience that should be brought into the classroom; but, it provides decision situations which cannot be provided easily in other ways.

How the game is to be used in the classroom is the first major consideration. Some instructors prefer to use the game in a 'Lab' situation with the teams making and submitting decisions during scheduled lab time. Others prefer to have decisions made outside of regular class time. The reliability of the game and the efficiency of the computer program become major considerations for any game, but particularly where the lab situation is used or several decisions are to be made in a short period of time. Under either system, if students are expected to make timely decisions, they have a right to expect equally timely return of their reports. This often becomes a major administrative problem with long and complex programs.

Clearly, the first requisite of the game selection process is an understanding of the course objectives and the role that the game will play in achieving those objectives. Factors to consider include the knowledge and ability of the students and the time that is to be devoted to the game.

The Game Environment

The next major point for consideration is the game environment. While most games are general and do not attempt to approximate the response of a particular industry, some games are very specific. The major limitation of most games, however, is that they are designated with less than ten teams as the maximum number that can participate in each game. This not only affects the response which the game has to a team's decisions, but tends to limit or place constraints upon the administration of the game in the classroom.

While the difference may not be important to some instructors, I prefer to have students making decisions in a competitive environment rather than an oligopoly f or two reasons. First, I feel that the competitive environment is more universal and more nearly the environment that most will face when they graduate. Second, when one team out of six makes radical decisions, it tends to have a major influence upon the averages throughout the industry and may cause effects which are not realistic. At one time, I used a game that required only three teams. The game had many good features, but was very sensitive to major changes in the decisions of any one team.

Another problem that arises when the number of teams is limited is that the teams are usually selected to accommodate the game and not to accomplish the course objectives. For example, I know of one situation where average class size was 35 and the class was divided into the three

teams needed to play the game. It is not only difficult to find a time that a team of 10 to 12 students can meet, it is almost impossible to have meaningful involvement of this many students in the decision-making process. To operate more than one game in the class is the obvious solution, but this tends to complicate grading and some students contend that the competition in their game was more aggressive than other games. This also adds to the administrative problems of keeping decisions and reports separated.

Certainly, it is not for me to dictate what environment is best for a particular class; however, the relevant issue is that this is a factor which may have a major influence upon the lessons of the game as well as the administrative headaches. By recognizing the problem and considering the course objectives, it is often a relatively easy matter to alter the game to better satisfy your particular needs.

The Complexity of the Game

Another factor to be considered in the selection process is the complexity of the game. While the more complex game with more decisions and more involved calculations may better approximate the conditions of an actual business or industry, it will also complicate the student's problem in learning the game parameters and increase the computer space and time requirements.

Again, the decision concerning the game to be selected depends upon the objectives of the course and the students. Needless to say, selection of a more complicated game with a greater number of game decisions requires more student deliberation and, therefore, implies that the instructor expects his students to devote more time to the game.

While it is probably not efficient to make major changes in a game program, I am currently using a version of The Executive Game in which we have added long and short term loan options, the ability to buy and sell common stock, and marketable securities. These changes were introduced to expand the financial options and add a new dimension to the game. However, the cost of these and other changes has been to double the length of the program and the time required to run the game.

The Balance Between Realism and Ease of Operation

The fourth area to consider in selection of a game is related to the ability of the game to provide realism. Generally, the more complex, the more realistic the game. However, it is sometimes possible to modify a game to improve its approximation of industry responses without materially increasing its complexity. Three courses of action are available: (1) change parameters of the game, (2) set limits upon game parameters, and (3) introduce real values.

Changing the parameters, such as the response of the game to a change in price or marketing expenditure is a radical and sometimes very drastic action. Unless you have considerable knowledge of the game program, it is possible to create more problems than you solve when you being to alter major parameters. However, I have found that there is some advantage to

this course of action when a game is too sensitive to one parameter, such as price changes. For example, the game that we are now using is written so that price changes have an effect greater than the change. We have modified the price so that decreases have less effect than the price change and increases continue to have a greater effect. This tends to penalize teams that make frequent and radical price changes, both up or down, rather than just increases in price.

A less risky, and probably more practical, way to alter the response of a game is to place limits upon some of the parameters. Continued use of one game has shown the need to add a lower limit to price, some limitations upon borrowing and other factors which tend to allow teams to 'beat' the game program rather than 'win' the game. These limits are easily introduced and removed by the addition of a single statement which rarely affects other relationships in the program.

Probably the most practical method of altering game programs is the addition of real values, such as economic indexes. The index can be taken from historic data and read into the computer rather than computed from some mathematical approximation. It is possible to introduce realistic turns in the index rather than some random variation upon a general trend line. I currently have six different economic indexes which I choose randomly. The only information that I give students is the index is taken from the US economy since 1950 and that they will encounter at least one depression or recession during the period of play.

At first, students tend to be overly concerned about the unknown economic index; but, they soon learn that it is only one of several factors which influence industry demand and, by the end of the game, most teams have learned to forecast sales within five or ten percent of total demand.

Because we all face slightly different situations and students, there is no best set of parameters for a game. This is exactly why the game administrator should consider his own situation and needs in selecting or modifying a game. When an administrator takes the time to study and modify a game, he has probably evaluated other elements of his course in an effort to improve the effectiveness of the total learning experience. It should also be pointed out to the inexperienced that all computer installations are slightly different and that it is usually necessary to make minor modifications to adapt the program to the particular situation.

A final reason why it is sometimes necessary to modify the program is that students are quite ingenious in detecting flaws in the program which allow them to 'beat' the game. I have found that the following quarter after a student finds one of these flaws at least half of the teams have learned of the flaw and react accordingly. My practice in this event has been to allow the student who finds the flaw to profit by his ingenuity if it does not affect other teams adversely, but then alter the program to block future attempts to use the method.

IMPROVING ADMINISTRATIVE EFFICIENCY

Probably the largest problem the administrator faces is the demand the game places upon his time. While most universities are not too concerned about the cost of the computer time, the time required by the administrator or a graduate assistant in supervising and performing the routine of collecting decisions, processing them through the computer, and then distributing reports to the game teams requires a major commitment to games. While it is impossible to eliminate all of these costs and headaches, it is possible to reduce some of them through planning. Three areas of administration have proven fertile for such improvement: (1) the computer input/output system, (2) use of an input file, and (3) the development of a re-set program.

Input/Output Systems

Each computer system has its own set of peripheral equipment and methods of communicating with programmers and users. Games are developed for card input since this is the most universal and compatible form of input. However, most universities also have alternate means of entering large quantities of data and this usually includes some form of 'mark-sense' reader or scanner which is used to enter scores from machine graded exams.

The problem with card input is that the cards must be key-punched and the process of keypunching is highly susceptible to human error. One solution is to have game teams submit decisions pre-punched and to simply read the cards into the machine as they are submitted. While this places the burden to ensure accurate punching upon the team, it does not improve the situation if students are not familiar with the keypunch machines. Another solution is to prepare mark-sense forms to be marked and submitted by the team. Most students are familiar with the use of test forms and find completion of the forms rather simple. In either system, the burden of entering the proper decision falls upon the game team and they may be expected to establish a control system to protect against errors or, if not, be required to live with the errors. The forms have one other advantage over cards in that they are easier for people to read and check a decision.

Use of an Input File

One change that I have found to be particularly helpful in the administration of games is to alter the program so that an input file is created under a specified name and saved in the computer or on tape. Each decision period, the input file is updated and then read into the game program. This does not materially change the operation of the program, but it guarantees an input for all game teams. Teams are then given a time and place to submit decisions and failure to submit decisions on time results in the previous decision being read into the computer from the decision file.

The advantage of this system is that the administrator is no longer bound by a team that is late submitting decisions. Once informed of the

system and its operation, most students manage to make the schedule. In the few instances where a team fails to meet the schedule, it is possible to run the game on time and the team soon learns a lesson in punctuality. The main advantage here is that a schedule can be maintained, but students also learn a valuable business lesson.

A possible modification which can be added is to develop a program to read the input file and compare decisions. In a fraction of a second of computer time, a list of "Anti-trust violators" can be produced which can then be used to force teams to make individual decisions and avoid future collusion. This also can become a valuable lesson and will bring moral and ethical issues into the game.

Development of a Re-Set Program

Once in a while, something happens which causes a bad decision to be read into the game or possibly you would like to illustrate the effect that a different decision would have upon a game situation. To replace a decision with a new one, it is often necessary to re-run all past decisions, particularly if the history data is stored in the computer. To avoid this problem, a re-set program which will correct the history file and return the game to a previous set of conditions is a very valuable tool to have. The program is generally quite simple to write, does not affect the game program, but simply alters the history file or deck. The only factor that must be considered is the possibility of creating a history format that is not identical to the history produced by the game. This should be no problem if your programmer understands the format of the history data and performs his task carefully.

To me, the changes necessary to improve the input and to be able to restart a game from any desired period of play are the most time saving of all of the things that a game administrator can do. In addition, they provide a degree of safety because they eliminate the biggest problems the administrator faces and provide a means of correcting any errors that may occur.

INCREASING STUDENT INVOLVEMENT

A third area, where a game administrator can make changes which will improve the quality of the game experience, concerns the participation or involvement of the students. I know of one situation where almost unanimous student dislike of a computer game was turned into unanimous support by changing only the administration of the game situation. Three factors appear to hold the key to gaining student acceptance of the game; (1) the game teams and how they are formed, (2) the reliability of the game, and (3) the grade or reward for participation.

Selecting Game Teams

Closely related to the question of course objectives is the method of selecting or assigning students to game teams. You must determine whether course objectives would be better met by individual students playing separately or through a team effort. If teams are to be assigned,

the team composition and method of selecting members become important factors to consider. I have found that teams of three to five students generally encourage more involvement than smaller or larger teams. This is influenced some by the particular game played--a more complicated game with more decisions to be made may require more students. I have also found that the students gain greater satisfaction and make better decisions when the team consists of students with varied backgrounds and majors. For example, two marketing students may tend to argue whether the price should be $6.49 or $6.51. While there may be some difference between the response of the game to these two prices, it is likely that the team will devote all of their time and energy to resolving the price issue and fail to evaluate changes occurring in the market or the need to divert funds from marketing to production operations.

Another factor to consider in selecting teams is whether teams should be appointed by the instructor or whether students should be allowed to select team members. Since performance of the team is so dependent upon the ability of the team to get together and to work together, I prefer to have students select teams and only assist in placing the last few students who have not found a team. I have not found that this method of team selection produces any wider variation of performance than my attempts to balance teams.

Although I like to have all students in all sections of course playing in one game, there is some advantage to having several games operating at the same time. It is sometimes useful to assign each team in a given section of the course to a different game. Thus, during class discussions, game teams can freely discuss their situations and ask other classmates for suggestions and advice. While this may provide some additional stimulus to open discussion, some students are still reluctant to bring up problems because they fear that classmates will relay the information to their competitors.

The Reliability of the Game

A reliable game program that runs smoothly and can provide rapid return of reports to participants reduces administrative headaches and increases the enthusiasm in the game. This enthusiasm can be measured by the interest shown when each set of reports is received. As students become more involved in the game, they tend to become more eager to learn the outcome and press for an earlier return of the reports.

Any deviation in the game, such as delays in receiving reports or errors, tends to cause the students to lose interest and rationalize that it is not a realistic experience and therefore, not worthy of their efforts. My experience suggests that it takes two or three decisions for students to learn the parameters of the game and that the learning curve continues for at least 10 or 12 decisions. Therefore, I make every effort to turn two decisions per week with students meeting outside of class time. My current schedule returns the reports to the students 24 hours after submission and gives them two or three days between the receipt of one report and the submission of the next decision.

Grading and Evaluating Game Performance

Although students generally will tell you that they prefer a computer game to other class activities, it is a fact of life that students will not participate unless they are rewarded for their efforts in terms of a grade. To a certain extent, this is unfortunate because I sometimes get the feeling that the students that seem to make all of the mistakes in the game and have to fight for their lives, are the students that come out of the game with the greatest understanding. The problem, then, is how to design a reward system that will encourage the students to participate in the game.

Since our society offers some reward to individuals and firms that are able to amass larger amounts of money, it is difficult to not offer some reward for the ability to earn greater profits than competitors. On the other hand, I have seen many situations where the good teams have tried more alternatives and come in behind a team that was just lucky and took few risks.

My solution to this dilemma has been to use two criteria in evaluating team performance. The first is the relative performance--in terms of rate of return on investment--and the second is a subjective evaluation of the management processes of the team in terms of the planning, setting of goals and strategies, and their analysis of performance. To organize this evaluation, I ask all teams to submit written goals and then hold a review session at the end of the first game year. The team makes a report to the 'Board of Directors' on past performance and future corrective action and strategy. By holding these sessions after the first year of play, but before the mid point of the game, it is possible to point out erroneous thinking and to guide the team to areas where they can improve their performance. An alternative is to ask each team to prepare an Annual Report to their stockholders. As in other group projects, I generally allow the students to distribute grades to their teammates through a peer evaluation process. This rewards students who carry the load of the game even though their efforts are not individually visible.

CONCLUS IONS

While knowledge of computers and experience in computer programming may be helpful for those who wish to use games in their courses, it is not necessary because most computer centers have personnel available to assist with the technical aspects of preparing and running a game program. What is required to achieve a successful gaming experience is an effective administrator to supervise the overall operation of the game.

The problems of administrating a computer game are no different than other class exercises and the instructor that understands basic administrative principles can apply them to a game as easily as any other activity. In the final analysis, three areas hold the key for success: (1) selection of a game that will contribute to the course objectives, (2) development of an operational system that will provide efficient processing of the necessary volume of paperwork, and (3) an understanding of techniques that will encourage participation by faculty and students.