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A TERMINAL KEYBOARD EXPERIENCE IN EXECUTIVE GAMING

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SYNOPSIS

The traditional computer based business game requires students to submit their decisions for each game period on some type of printed form. The decisions are then keypunched into cards and included as input, perhaps along with a "history deck," to a computer program. Finally, the computer print-out results of the program are distributed to the students. This procedure usually creates a relatively long delay between the students' submission of decisions and their receipt of the results. In addition, gathering and entering input, maintaining history data, and distributing output tend to be troublesome and error-prone processes.

The authors have developed a business game implemented on a time- shared computer system. This eliminates most of these intermediate processes by enabling the students to enter their decisions and obtain results directly from the computer. In addition, they may use the computer terminal to write and access analytic programs to aid in making those decisions, and to analyze the output result from their decisions.

A typical cycle for a period of play includes the following steps. Students access the game through a pass-word protected identification using a teletype terminal. They. submit their decisions for the period of play in response to questions from the interactive program. All teams must enter their decisions by a deadline. After the deadline, the game administrator uses a computer terminal to issue the necessary commands to run the programs for a period of play. Immediately thereafter, the students may return to a terminal and obtain the results from their own protected file. Many students write their own time sharing programs (or use "canned" programs) to analyze the output and prepare forecasts to aid in making their decisions.

The result is a dynamic and stimulating game experience which generates a great deal of enthusiasm and excitement among the students.

INTRODUCTION

The typical computer-based business game is implemented in a batch processing environment. Students prepare their decisions for a period of play, usually on a specified form, and submit them to a "game administrator." Later, the students receive a report depicting the results of their decisions and those of their competitors. The game administrator must manage the intermediate steps which usually include keypunching the decisions, entering the "decision deck" along with a "history deck" from the previous period, arid obtaining and distributing the output.

There are at least three difficulties with this system.

(1) The turnaround time between students' submission of decision and their receipt of the results is often a disruption to the flow of play. By the time the results are received, they must review the decisions and the thought processes that led to them.

(2) The logistics of managing the steps in the batch process tend to be troublesome and error prone. The maintenance of the history decks and decision decks, and their proper sequencing for submission to the computing center, are particularly problematic if there are many teams and industries.

(3) The students' relationship with the computer is remote and passive. Although the computer is nothing more than a mechanism for running the game and performing the calculations, the absence of interaction and understanding produces the feeling that the computer victimizes the players. Instead, the relationship should reinforce the feeling that the computer is a tool to aid decision making.

The authors set out to devise a gaming environment that would minimize or negate these disadvantages and reinforce the advantages of game play. The result is a game implemented in a time-sharing environment. Students enter their decisions directly and interactively. They receive results directly, upon request, usually within a few minutes after the deadline for decisions. Finally, they use the computer as a tool in the analysis of data to support the decision making process.

NATURE OF THE GAME

The authors' primary objective was to enhance the interaction between the students and the simulation, in order to create a more stimulating and productive learning experience. Primary concern was not with the internal logic of the simulation, so that it was appropriate to modify and extend a well tested and documented simulation for which student textual materials were available. Such a simulation is The Executive Game by Henshaw and Jackson.[1] The FORTRAN program for the Executive Game was converted to BASIC programs and files for implementation on a Hewlett-Packard 2000E, a relatively small and limited timesharing machine. Implementation on the 2000E demonstrates the feasibility of using a comprehensive simulation on a small machine, and facilitates installation and use when large computer systems are not available. The limitations of the 2000E result in a system of 9 BASIC programs and 4 data files, but the response time and interaction capabilities are quite good. In addition, the time-shared version of The Executive Game

[1] Henshaw, Richard C., Jr. and James R. Jackson, The Executive Game,1972, revised edition, Richard D. Irwin, Inc., Homewood, Illinois.

provides some very desirable capabilities and features not present in the batch version.[2]

SEQUENCE OF EVENTS

The typical sequence of events for a period of play begins when students are ready to submit a set of decisions. A representative from each team uses a teletype terminal to access the game program. The access is controlled and validated through the use of password protected identification for each team. The decisions are entered in response to an interactive program which requests the appropriate inputs. The decisions are stored on a data file in preparation for the subsequent simulation run. Figure 1 shows a sample terminal session for inputting a set of decisions.

All teams in an industry have a deadline by which time they must have their decisions entered. After that time, the game administrator (GA) accesses the system, also through a teletype terminal, but with a higher priority and more secure identification. If a team has failed to enter a set of decisions, the previous period decisions are continued. At the discretion of the GA, they may be fined up to $50,000 for failing to submit decisions on time. By issuing a few commands, the GA executes the simulation programs for the period. The output of the run is not printed, but stored on a file accessible by each team. The GA may also punch paper tape backup of the decisions and output if he so desires.

Immediately after the simulation run, team members may access their file to obtain the results of the period of play. Once again, through the use of password protection, only information for their own team is available to them. If four periods (quarters) of play have transpired, they will also obtain an annual summary. Figure 2 shows a terminal session producing reports from a period of play (with annual summary).

The game administrator or instructor may obtain access to the files of all teams by using the same password and identification the students use. He may also obtain a formatted summary of all the teams in an industry by using a special password for each industry. Figure 3 shows the output from such an instructor terminal session.

After receiving the output from one quarter, and before entering decisions for the next quarter, students may wish to perform some computer analyses to develop their decisions. For example, students have written their own programs for breakeven analysis and have utilized packaged programs for statistical analysis of advertising effectiveness and demand forecasting.

[2] The authors gratefully acknowledge the significant contributions of Richard Lenox who was responsible for the systems design and programming of the Time-Shared Executive Game.

ADDITIONAL FEATURES

The system is equipped with a log file that records each access to the files by students and administrators. It also serves as a message file to facilitate communication between the students and the game administrators or instructors. The GA can leave a message for all teams that prints whenever a team accesses the system. Such a common message might carry the deadline for the next decision set, expected availability or unavailability of computer resources, etc. The GA may also leave a message for one specific team, such as notification that a fine was imposed for late decisions, or suggestions for a team that needs special help. This log file capability can also allow individual teams to leave messages for the GA if they have questions on the results or the procedures.

Another feature which facilitates the use of the system is the autonomy of industries. The current file capacities will accommodate a maximum of 8 industries with up to 9 teams per industry. Of course, each industry is a closed system because of the total market demand for which the teams compete, so an industry comprises the basic simulation run. However, the industries are independent and need not be run at the same time during the week. Neither do they need to be on the same period of play. This arrangement allows several classes on different time schedules to proceed at different rates. One instructor may start his class on the game during the first week, while another may wait several weeks to begin. Each class may have its own GA who runs the simulation at a specific time during the week. Alternatively, all industries may be run at the same time each week by a single GA, even though the industries are on different periods of play. The flexibility in scheduling the rate of progress is an invaluable characteristic when the game is used in a multiple section course with several instructors.

SUMMARY AND CONCLUSIONS

This time-shared version of The Executive Game has proven to be a significant improvement over the batch version in several ways. During the current year, we have used the game in an undergraduate management case course. Six sections of the class used the batch version while two sections used the time-sharing version on a pilot basis. Although formal tests of the learning experiences under each approach have not been completed, preliminary reports are encouraging. The game administrators report that the time-shared game is much easier to run than the batch. Also, the students using the T/S version are much more involved and enthusiastic with the game. Several of them have learned BASIC on their own in order to utilize the computer to aid in the game play. All evidence suggests that the time-shared game will enhance the learning experience of the students while easing the game administration process.

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HELLO-A345

THURSDAY APRIL 18 05:14 PM DAY 108          1974

GET-$:GAME
RUN
:GAME

WELCOME TO MGT345 EXECUTIVE GAME ON 4/18/74  5:14 PM
INDUSTRY      #?1
FIRM          #?1
PASSWORD?
NOTICES:
THERE WILL BE TWO DECISIONS DUE NEXT WEEK. THE
DEADLINES WILL BE TUESDAY AND THURSDAY AT NOON.
DO YOU WISH TO ENTER DECISIONS?YES
OK, PLEASE TYPE IN THE FOLLOWING FIGURES:
PRICE                 ?6.35
MARKETING             ?500000
R & D                 ?750000
MAINTENANCE           ?400000
PRODUCTION  ?1000000
PLANT         ?670000
RAW MATERIALS         ?1500000
DIVIDEND              ?50000
INPUT COMPLETE…HERE ARE YOUR DECISIONS AS I SEE THEM:

MARKETING             $500000
R & D                 $750000
MAINTENANCE           $400000
PRODUCTION  $1000000 UNITS
PLANT         $670000
RAW MATERIALS         $1500000
DIVIDEND              $50000
ARE THESE FIGURES CORECT?YES
DONE
BYE
003 MINUTES OF TERMINAL TIME
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FIGURE 1
SAMPLE STUDENT TERMINAL SESSION: INPUT

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HELLO-A345,

THRUSDAY APRIL 18 05:18 PM DAY 108          1974

GET-?:GAME
RUN
:GAME

WELCOME TO THE MGT345 EXECUTIVE GAME ON     4/18/74  5:18 PM
INDUSTRY#     ?1
FIRM #        ?1
PASSWORD?
NOTICES:
THERE WILL BE TWO DECISIONS DUE NEXT WEEK. THE
DEADLINES WILL BE TUESDAY AND THURSDAY AT NOON.
DO YOU WISH TO ENTER DECISIONS?NO

PERIOD 8.       PRICE INDEX 107.9       FORECAST, ANNUAL CHANGE 4.5%
SEAS.INDEX 100          NEXT QTR 95.    ECON.INDEX 97.          FORECAST,NEXT QTR 95.

OPERATING STATEMENTS----------------------------------------------------------------------
MARKET POTENTIAL                                    1288923.
SALES VOLUME                                                1288923.
PERCENT SHARE OF INDUSTRY SALES                     22.
PRODUCTION, THIS QUARTER                            1450000.
INVENTORY, FINISHED GOODS                                   354459.
PLANT CAPACITY, NEXT QUARTER                        535437.

INCOME STATEMENT--------------------------------------------------------------------------
RECEIPTS, SALES REVENUE                                                     8120215.
EXPENSES. MARKETING                                         1775000.
        RESEARCH & DEVELOPMENT                      783000.
        ADMINISTRATION                                      612014.
        MAINTENANCE                                         290000.
        LABOR (COST/UNIT EX.OVERTIME $1.36)         1976948.
        MATERIALS CONSUMED (COST/UNIT $1.38)        1999889.
        REDUCTION, FINISHED GOODS INV.              -550242.
        DEPRECIATION (2.50%)                        279538.
        FINISHED GOODS CARRYING COSTS               188398.
        RAW MATERIALS CARRYING COSTS                110580.
        ORDERING COSTS                                      53151.
        SHIFTS CHANGE COST                                  0.
        PLANT INVESTMENT EXPENSES                           0.
        FINANCING CHARGES AND PENALTIES             207030.
        SUNDRIES                                            115709.         7841016.
PROFIT BEFORE INCOME TAX                                            279199.
INCOME TAX (IN. TAX.CR 0.%, SURTAX 0.%)                             132391.
NET PROFIT AFTER INCOME TAX                                         146808.
DIVIDENDS PAID                                                              400000.
ADDITION TO OWNERS EQUITY                                                   -253192.
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FIGURE 2
SAMPLE STUDENT TERMINAL SESSION: OUTPUT
including annual report (PAGE 1)

CASH FLOW----------			
RECEIPTS, SALES REVENUE			3120215.
DISBUSEMENTS, CASH EXPENSE		6111831.	
	INCOME TAX	132391.	
	DIVIDENDS PAID	400000.	
	PLANT INVESTMENT	0.	
	MATERIALS PURCHASED	2000000.	8644222.
ADDITION TO CASH ASSETS			
FINANCIALSTATEMENT----------			
NET ASSETS, CASH		-1666446.	
	INV. VALUE, FINISHED GOODS	1130388.	
	INVENTORY VALUE, MATERIALS	2211714.	
	PLANT BOOK VALUE (REPLACE. VAL. $ 11863928.)	10901972.	
OWNERS EQUITY (ECONOMIC EDQUITY 13539584.)		12577628.	

INFORMATION ON COMPETITORS----------

FIRM	PRICE	DIVIDENDS	SALES	VOLUME	NET PROFIT
1	$6.30	$400000.	1288923.	UNITS	$146808.
2	$5.85	$0.	521742.	UNITS	$-1468730.
3	$5.55	$0.	1405300.	UNITS	$-379390.
4	$6.10	$100000.	763914.	UNITS	$27584.
5	$5.95	$0.	1421879.	UNITS	$226982.
6	$5.98	$0.	461348.	UNITS	$-243815.

SUMMARY INFORMATION AS OF THE END OF FISCAL YEAR 2:

FIRM	NET CASH ASSETS ($)	INV. VAL. FINISHED GOODS ($)	INV VALUE MATERIALS ($)	PLANT REPL VALUE ($)	OWNER ECON EQUITY ($)
1	-1666446.	1130388.	2211714.	11863928.	13539584.
2	-4066270.	1622934.	500000.	10064696.	8121361.
3	-842655.	0.	1400000.	10256774.	10814120.
4	101531.	1219113.	900000.	9535170.	11755814.
5	267211.	226908.	1750000.	9798954.	12043074.
6	1025440.	31396.	649319.	8693472.	10399628.

AVERAGES PER QUARTER FOR FISCAL YEAR 2 ONLY:

FIRM	MKTING ($)	R & d ($)	SALES VOL (UNITS)	NET PROFIT ($)	RATE (%)	RANK
1	1581539.	1033594.	1454172.	396511.	19.64	1.
2	725000.	62500.	410815.	-780323.	-12.54	6
3	1825000.	650000.	1390949.	-118367.	0.65	4.
4	1331728.	586930.	1007169.	53176.	8.37	3.
5	1812500.	642537.	1326512.	163410.	9.58	2.
6	726250.	162500.	435674.	-278994.	-1.18	5.

DONE
BYE
008 MINUTES OF TERMINAL TIME

FIGURE 2 (Cont.)
SAMPLE STUDENT TERMINAL SESSIONS: OUTPUT
Including annual report (PAGE 2)

HELLO-A345,

THRUSDAY APRIL 18 05:27 PM DAY 108 1974

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RUN
:GAME

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FIRM # ?0
PASSWORD?
NOTICES:
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DEADLINES WILL BE TUESDAY AND THURSDAY AT NOON.
DO YOU WISH TO ENTER DECISIONS?NO

PERIOD 8. PRICE INDEX 107.9 FORECAST, ANNUAL CHANGE 4.5%
SEAS.INDEX 100 NEXT QTR 95. ECON.INDEX 97. FORECAST,NEXT QTR 95.

INFORMATION ON COMPETITORS----------

FIRM	PRICE	DIVIDENDS	SALES	VOLUME	NET PROFIT
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AVERAGES PER QUARTER FOR FISCAL YEAR 2 ONLY:

FIRM	MKTING ($)	R & d ($)	SALES VOL (UNITS)	NET PROFIT ($)	RATE (%)	RANK
1	1581539.	1033594.	1454172.	396511.	19.64	1.
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4	1331728.	586930.	1007169.	53176.	8.37	3.
5	1812500.	642537.	1326512.	163410.	9.58	2.
6	726250.	162500.	435674.	-278994.	-1.18	5.

DONE
BYE
004 MINUTES OF TERMINAL TIME

FIGURE 3
SAMPLE INSTRUCTOR TERMINAL SESSION: OUTPUT
Including annual report