BLOCKS & CHIPS: A COMPUTER-ASSISTED, GENOTYPICAL ENTREPRENEURIAL GAME

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ABSTRACT

This paper demonstrates the possibility of developing genotypical games that are fun to play, that are easy to run, that enable students to practice skills, and that are suitable for use as a medium of research. Blocks & Chips is such a game. The game is essentially an extended role-play. Players engage in entrepreneurial activities, and are assisted by interactive computer programs that simulate the game, that track the flow of funds, and that keep books. Players are both consumers and producers. As consumers, they purchase chips, the bases of scores. As producers, they participate in one or more of five industries (mining, chip manufacturing, block manufacturing, construction, and banking) essential to the game. Goods are represented by drawn pieces of paper of various sizes. Manufacturing is accomplished by gluing certain pieces of paper to other pieces of paper. The buying and selling of goods are done face-to-face. Feelings arising from unrestricted face-to-face interactions make the game genotypically real.

INTRODUCTION

An educational game may be used to familiarize students with a particular process, or it may be used to give students practice in manipulating the process. A game designed for the first purpose ought to be phenotypically real; one designed for the second purpose must be genotypically real. Blocks & Chips is a game designed to give students practice in entrepreneurship. The game requires face-to-face interactions, it is computer assisted, and it is genotypically real.

For students to develop skills in entrepreneurship, the students must do what entrepreneurs do, and they must feel what entrepreneurs feel while doing it. Entrepreneurs develop partnerships, negotiate deals, construct proformas, and arrange financing [3] . In Blocks & Chips, the students do the same. Entrepreneurs work with the feelings that arise from face-to-face interactions. In Blocks & Chips, the students experience similar feelings because face-to-face interactions are required in almost everything they do. The computer assists by simulating the game, by clearing checks and executing banking transactions, and by keeping financial records. The students do not play with the computer; they play with the assistance of the computer. The game is genotypically real.

STRUCTURE AND PROCESS

The game consists of five industries: mining, chip manufacturing, block manufacturing, construction, and banking. Goods are represented by drawn pieces of paper of various sizes. The manufacturing process consists simply of gluing certain pieces of paper to certain others to form a finished product. A chip is made by gluing one basic unit on to a chip frame. A block is made by gluing two basic units on to a block frame. And a building is made by gluing blocks on to a building frame. All products and how they fit together are illustrated in Figure 1.

The object of the game is to acquire chips. Scoring is individualized: each player's success is measured by the

FIGURE 1
THE SYSTEM OF PRODUCTION
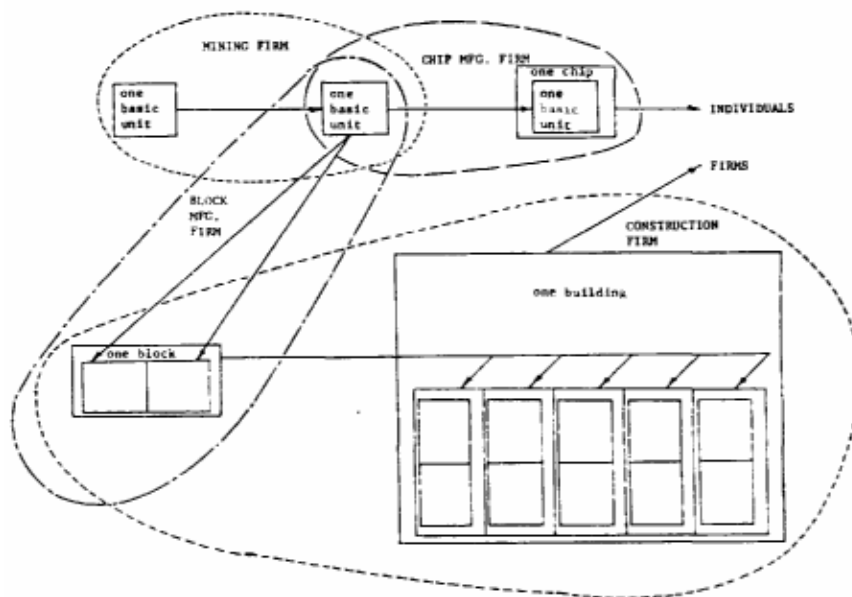
number of chips he or she personally acquires and surrenders to the instructor. To get chips, each player must buy them from a chip manufacturing firm; to buy chips, each must have a source of income; and to secure a source of income, each must be an owner or an employee of an operating firm. Hence, each player produces as well as consumes. Such is the game, and such is life.

All firms purchase primary materials (basic units, chip frames, block frames, and building frames) from the instructor; firms purchase secondary materials (basic units and blocks) and buildings from each other. These commercial transactions are structured as shown in

Table 1. Mining firms buy basic units from the instructor, and sell them to chip manufacturing firms and to block manufacturing firms. Chip manufacturing firms buy basic units from mining firms, buy chip frames from the instructor, manufacture chips, and sell the chips to individual players. Block manufacturing firms buy basic units from mining firms, buy block frames from the instructor, manufacture blocks, and sell the blocks to construction firms. Finally, construction firms buy blocks from block manufacturing finns, buy building frames from the instructor, construct buildings, and sell the buildings to all firms.

To help players understand the dynamics of the game, the entire system of the game is simulated by a computer program, BLIPS. By running program BLIPS interactively and iteratively, students can determine what cannot, because of the economics, happen in the game, and the economic consequences of that which can. They will see the effect of conditions and decisions, of prices, of quantities, of leverage, of salaries, of taxes, and more, on the financial status of firms and individuals in every industry. Yet, because the game is genotypically real, and because BLIPS is only a simulation of that reality, BLIPS cannot establish that a particular set of decisions is best. It can show that certain sets are bad and that good sets must fall within certain ranges. Oftentimes, that is good enough.

Companies create proformas, keep books, and make financial reports by running, correspondingly, three interactive programs: PROFORMA, JOURNAL, and REPORT. The three programs are linked so that values entered through program PROFORMA and program JOURNAL will appear together side-by-side on the same pages of output upon running program REPORT. The three programs perform the record-keeping and reporting functions that computers commonly perform in the real, real world,

TABLE 1
COMMERCIAL TRANSACTIONS

SELLER	BUYER					
	Mining Finns	Chip Mfg. Firms	Block Mfg. Firms	Construction Firms	Banking Firms	Individuals
INSTRUCTOR	basic units	chip frames	block frame	building frames		
MINING FIRMS		basic units	basic units			
CHIP MFG. FIRMS						chips
BLOCK MFG. FIRMS				blocks		
CONSTRUCTION FIRMS	buildings	buildings	buildings	buildings	buildings	

The media of exchange are checks, the only form of money used in the game. Funds, upon which checks are drawn, come from grants by the instructor, and from bank loans. Checks are deposited and cleared electronically: the depositor enters checks received on an interactive computer terminal and receives a printout confirming receipt. Banking conditions are also set electronically: the instructor sets conditions for banking firms, who, in turn, set conditions for the individual players and firms that are their customers. Two computer programs[1], CUSTOMER and BANKER, do the work.

RULES AND PROCEDURES

A few rules are necessary to ensure that all players are moderately active, and that reasonable order is maintained. First, all companies should be required to make use of a depreciating building. This rule creates demand activating the block manufacturing and construction companies. Second, credit towards grades given for chips acquired by players and surrendered to the instructor should conform to an exponentially declining schedule[2] of diminishing return. This rule dampens

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[1] All programs are interactive, and written for direct entry by players. They are written in IBM's VSPC Fortran. None of the programs exceed 1,500 lines of coding, nor require more than 60,000 bytes of storage.

[2] For example, one point might be given for the first chip surrendered each period, one-half point for the second, one-quarter point for the third, and so forth. The sum of points in this series converges rapidly to two.

demand so that chip manufacturing companies will not become hyperactive. Third, the instructor should limit sales of primary materials so as to minimize speculative buying, thereby preventing catastrophes. These three rules suffice to keep the players active, and the game orderly.

To start the game, the instructor can assign students to teams and teams to industries. But a better procedure, one that allows students more control over their destinies, is to permit students to form their own teams and bid for licenses in each industry. This procedure usually results in teams of different sizes, and can fairly result in industries of different concentrations, depending upon the bids the instructor chooses to accept. To ensure that students have several opportunities to practice entrepreneurial skills, the instructor should, once or twice in the course of the game, require students to dispose of their holdings and reestablish themselves in another industry. So that students can appreciate the difference taxes make, the instructor should introduce taxation sometime in the middle of the game. The bookkeeping program, JOURNAL, is capable of accounting for taxes on personal income, taxes on corporate income, and taxes on capital gains.

Hence, the game can be played with few rules and required procedures. In fact, the game works best that way, because keeping such contrivances to a minimum allows economical, psychological, and sociological realities to stand out clearly.

CONCLUSION

A good education trains students for reality [2]. In apprenticeships and internships, students are trained for reality by reality. In Blocks & Chips, they are trained by a game that is genotypically real: the dynamics of the game are real. The game is essentially an extended role-play, useful for the same research and pedagogical purposes for which role-playing has been useful [1, 4, 5]. And because Blocks & Chips extends over a much longer interval of time than is feasible with regular role-playing, Blocks & Chips allows for research and training in matters too subtle to be grasped within the short lifetime of regular role-playing.

Blocks & Chips owes much to the computer. The game can be played without the computer, and in its initial version, was played without one. But the computer has eliminated a stifling volume of paper and clerical work to make the game fun to play and easy to run. Blocks & Chips demonstrates the possibility of using the computer to make genotypical games feasible. Perhaps a whole range of genotypical games assisted and supported by computer might be developed. Researchers would then have available a new media of research, and teachers, a set of new pedagogical tools.

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