COMMUNITY: A SIMULATION GAME FOR ENVIRONMENTAL INVOLVEMENT

by

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Chapter 1

INTRODUCTION

THE PROBLEM

> There are two spiritual dangers in not owning a farm. One is the danger of supposing that breakfast comes from the grocery, and the other that heat comes from the furnace.[1]

Throughout history man has used materials from the earth to satisfy his needs. Too often he has not realized the results of his actions. Forest and plant cover have been destroyed to build cities; coal and mineral resources mined to produce heat and durable materials; machines created, operated, and disposed.

The problem of the lack of environmental concern has received increased emphasis in the many books and articles written on the subject since the 1960's. A review of three major American environmental movements: Natural History, Preservation and Conservation, noted that, while major accomplishments had been made in all areas, people still needed to become more aware of their interactions with the environment; particularly in the economic and political

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[1]Aldo Leopold, A Sand County Almanac and Sketches Here and There, (New York: Oxford University Press, 1949), p. 6.

processes necessary to achieve solutions to pollution.

The need appeared not so much for information, but for a means of information delivery, because so much had been written, spoken, and shown concerning environmental action through various publishing and electronic media.

THE PURPOSE

The purpose of this thesis was to develop a method of information delivery that would communicate community processes in relation to the areas of economics, politics, and pollution. In researching alternative communications methods, the simulation game appeared to have possibilities for communicating concepts of environmental action because of its emphasis on active participation in a decision making structure.

THE ORGANIZATION

A review of the methodology of simulation gaming and representative simulation games helped produce ideas and techniques that were conceptualized in the game of "Community". The game model included rules, a game board, player roles, event cards, tokens and dice. A description of its components, its operation, and participant reactions indicate that groups use the learning objectives structured in the game to gain an awareness of economic, political and

pollution processes.

The appendices contain the entire game of "Community" in its playing form and the bibliography reviews books, articles, and games that exerted major influences on its development.

Continued use and development of the game and of simulation games is encouraged as a method of education and recreation.

Chapter 2

ENVIRONMENTAL MOVEMENTS

The 1970's produced an upsurge of environmental concern with historical antecedants which predate written history. Three movements were considered representative: the Natural History Movement, the Preservation Movement, and the Conservation Movement.

NATURAL HISTORY

> If any person thinks the examination of the rest of the animal kingdom an unworthy task, he must hold in like disesteem the study of man; similarly, the true object of architecture is not bricks, mortar or timber but the house, and so the principal object of natural philosophy is not the material elements but their composition and the totality of the form, independently of which they have no existance.[2]

The Natural History Movement probably was the oldest environmental movement. Cave drawings from the paleolithic period testify to prehistoric man's keen observation of animals[3] and ancient philosophers, such as Aristotle, were interested in the philosophical and intellectual study of

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[2]A.L. Peck, Aristotle: Historia Animalium, (Cambridge, Mass.: Harvard University Press, 1965). p. 657.

[3]Grahame Clark, Dawn of Civilization; the First World Survey of Human Cultures in Early Times, (New York, McGraw-Hill, 1961), pp. 29-30.

natural animals and objects.

The interest in drawing, dissection and observation of natural phenomena was continued in the present by proponents of the natural sciences. Biology, chemistry, geology and other sciences are basic to understanding the processes and products of nature. The Natural History movement and its offshoot sciences is probably the strongest and most widespread movement of environmental concern.

John James Audubon has been the best known of the American naturalists. He attempted in pictures and words to describe environmental components rather than philosophize about them and noted: "The astonishing tendency that men have to improve nature in their own way."[4] However, Audubon's own success lay in capturing, through visual drawings, natural poses that involved more than the birds he studied. William Swainson, a distinguished ornithologist of the time wrote of one drawing:

> The grouping of these creatures cannot be surpassed; it would do honor to the pencil of Ruebens. The penciling is such a perfect copy of nature, that although the attitudes are difficult, and perhaps uncommon, we fancy we have seen them over and over again.[5]

Audubon was neither conservationist no preservation-

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[4]Robert C. Murphy, John James Audubon, An Evaluation of the Man and His Work, (New York, National Audubon Society, 1956), p. 347.

[5]Ibid., p. 340.

ist and commented that it was a poor day's hunting if he shot fewer than one hundred birds. He discovered a new species of swallow in Louisianna not by studying birds; but by idly trying to see how many swallows he could kill before missing one. However, Audubon noted later in his life the disappearance of primitive nature and asked: "Where can I go now and visit nature undisturbed?"[6]

PRESERVATION

> John the Baptist was not more eager to get his fellow sinners into the Jordon than I to baptize all of mine in the beauty of God's mountains.[7]

John Muir developed the idea of wilderness with evangelistic force. He was a major force behind the wilderness preservation movement in America through his articles and the Sierra Club.

Muir lived from 1838 to 1914, a time that saw America move from a wild, unexplored continent to a settled, industrialized society. Muir, however, rejected the urge to tame nature and embarked instead on a crusade to live in and retain the American wilderness. Muir came from the Wisconsin farmfields and almost became an inventor of machinery,

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[6]Ibid., p. 350.

[7]Harvey Alden, "John Muir's Wild America," National Geographic, V. 143 No. 4, p. 433.

but hiking as a wanderer on a one thousand mile hike through the South, Muir found he delighted in the freedom of movement through nature. He then set off to explore South America, but developed malarial fever and turned instead westward to California where the Yosemite Valley became his spiritual haven.

It is easy to idealize Muir. His idylic descriptions of living in nature rivaled Thoreau's and yet he realized his descriptions were incomparable to nature's majesty. Muir was awestruck with nature and yet knew how fragile its components were.

The Preservation Movement unfolded in America from Muir's and other writer's pens as they described man's effect on nature. This spirit of preservation resulted in the national parks, first Yellowstone then Yosemite, Muir's own wellspring. The Preservation Movement gathered momentum and more parks were created; not for altogether altruistic ends. Railroads needed a drawing card to attract riders and the natural granduer of America was just the ticket.

Thus, preservation for the sake of nature itself received little emphasis but preservation for the benefit of sightseers became a major factor in the idealogy of present day America.

CONSERVATION

> The warrior chief, Tecumseh: Sell the country . . . why not sell the air, the clouds, the great sea?[9]

The word conservation was unknown in its present sense until the 1900's when Gifford Pinchot a New England aristocrat fresh out of forestry school in Nancy, France started a movement that reshaped the American view toward resources. While others deplored the rape of the land, Pinchot developed a systematic philosophy of resource management that influenced all he met; most significantly the president of the United States. Theodore Roosevelt and Pinchot gave impetus to the "Conservation" movement of resource management in America and, under Pinchot's direction, the Forestry Service became an exemplary bureaucracy for managing natural resources with the idea of continued production. As the American frontier disappeared and resources no longer could be used without thought for the future, the philosophy of conservation thus began to permeate the American view toward resources.

The Conservation Movement has continued to exert a most profound influence on man's relationship to his natural environment. Through governmental and private

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[9]Stewart Udall, The Quiet Crisis, (New York: Holt Rinehart and Winston, 1963), p. 8.

funds, bureaus and organizations have concerned themselves with wildlife such as fish, birds, and mammals; trees and plants; soil; water; and air. Most recently, energy use, land use, and population expansion have been recognized as major factors affecting efforts toward the conservation of all aspects of the environment.

The three environmental movements produced major contributions to man's awareness and understanding of nature. Most of the environmental ideas were communicated using either visual or oral methods.

Reviewing these writings and materials indicated that some of their inherent concepts and philosophy might be better communicated using a different method. Therefore, various methods were explored with simulation gaming felt to deserve further study and development as a medium for developing environmental awareness.

Chapter 3

SIMULATION

> Analogies are tools for turning the symbolic into the iconic, thus giving form and substance to what is illusive and invisible.[10]

The dictionary definition of simulation says it is the act of imitating, counterfeiting, or pretending. One of the simplest modern definitions says simulation is: "the development and use of models for the study of dynamics of existing or hypothesized systems."[11]

Simulation involves the construction of a model that the simulator pretends is characteristic of whatever it represents. This model is operated and performs like the original component according to the simulator's observation and theory of the original. Model airplanes are simulations of certain flight processes based on the observation of birds and the theory of air movement. Driver's education simulators try to duplicate automobile and traffic situations that confront the driver. Many atomic and chemical theories are based on model representations. Written

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[10]John Raser, Simulation and Society, (Boston: Allyn and Bacon, 1969), p. 5.

[11]John Taylor, Instructional Planning Systems, (London: Cambridge University, 1971), p. 9.

grammar is a model of language on which functions can be performed. The use of computers has resulted in complex models based on mathematical descriptions. Modern simulations may attempt to represent a system through three-dimensional objects, verbal, mathematical or pictorial devices.

The method of simulation can be said to involve several components:

1. Observation
2. Conceptualization
3. Representation
4. Operation
5. Transcription

A process must be perceived through observation or theorization, then conceptualized using a representative model. This model is operated and its resultant actions transcribed in some form.

Games were the forerunners of modern simulations. They are simpler, are played for pleasure rather than instruction, and have several common elements that depend on chance or skill. Chess is an example of a game requiring memorization and strategy skills, craps is a game depending almost solely on chance, and monopoly combines both chance and strategy.

Some games do not directly relate to the idea of

simulation. Sports games like baseball, football, and other games involving ball manipulation generally do not simulate any original design and indoor games like bridge or other card games are played mainly for the vigor of mental activity.

Modern simulation games combine features of both simulation and gaming. Simulations on computers, while exact and comprehensive, have been far removed from most people by cost, accessibility and language. Parlor games have been economical, easily accessible, and popular but have not involved realistic simulation of actual processes. Thus, simulation has produced important concepts and processes and gaming has produced involvement and personal contact. Combining simulation and gaming results in collecting together some of the attributes of each. John Taylor states:

> Gaming-simulation differs from other forms of simulation largely because of its reliance on human decision-makers as integral parts of the simulated system and because of its relatively low level of precision.[12]

This definition does not preclude the further sophistication of game simulations. At present, however, simulation and gaming have combined to produce a philosophical, conceptual, decision making way of interacting with other individuals

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[12]Ibid., p. 15.

and situations which analogize actual circumstances in an informal format that can influence the cognitive and affective areas of human development.

John Raser has defined two types of simulation game techniques. The "piecemeal" type attempts to define and simulate completely a small segment of a total original, while the "skeletal" type attempts to simulate a large and complex original using only certain key components.[13] Both these techniques have advantages and disadvantages when used to demonstrate processes. Piecemeal simulations allow more precise and detailed analysis of some unit at the expense of not including relationships with other units that comprise the complete original; while skeletal simulations include gross relationships but little detail. There is no perfect simulation of the original. With most simulation the tendency is toward abstraction and simplification. The simulator generally substitutes and analogizes simpler elements or stylized forms for the originals. The operation of a simulation game produces processes that can develop learning in individuals through intellectual, emotional and manipulative actions. The game provides an arena for the synthesis of actions and relationships among players, objects and concepts.

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[13]Raser, op. cit., pp. 26-28.

Chapter 4

METHODOLOGY

The review of environmental movements indicated that while individuals and group movements had espoused concern for the environment, this had been communicated mainly through verbal and visual media. After reviewing simulation gaming, this method appeared to offer an interactive process that could be used by the general public to promote the awareness and concern Audubon, Muir and Pinchot sought to achieve.

An exploration of simulation games currently on the market led to the proposal of a new game to be used by individuals and organizations, that would involve economic, political, and pollution processes; be simple enough for mass production and understandable by the majority of the public; yet complex enough to provide involvement in a multitude of decision making possibilities.

The game of "Community" was conceived as a skeletal type of game simulation using certain economic, political and environmental structures. It was based on generalized observation of four representative industries, political power, water and air pollution. These observations were conceptualized in a small community setting of thirty-three

players on a geographically represented game board.

The game stresses cooperation rather than confrontation, and encourages role playing and individual decision making while incorporating chance elements introduced by die rolls and random card selection.

LEARNING OBJECTIVES

Four learning objectives were built into the game components. The foremost objective was to provide a medium for personal interaction in a community setting. This personal interaction was then directed toward situations concerning economics, politics and pollution.

Political learning objectives stressed the involvement of individuals in gaining votes and working together to accomplish certain common ends they felt beneficial to the community.

Economic learning objectives centered around developing the concept that each individual was a part of the economic community whether in a sales, distribution, processing, production, laborer or ownership role.

Objectives in the area of pollution centered on making players aware that all individuals, groups, and industries cause air and water pollution and that such pollution can be mitigated through certain individual, group and community actions.

Chapter 5

"COMMUNITY"

GENERAL DESCRIPTION

The purpose of the game "Community" was to provide a context in which players can participate in economic, political and pollution actions that affect their community. The model components and their operation were developed for players to use in a group process.

The game starts after the players have read the rules. It proceeds with the organization of the game board, the selection of player roles, the shuffling of the event cards, and the die rolling and actions of the players. The game takes two or more hours to play and ends when pollution tokens cover the board or when players decide their community is as it should be.

Appendix A lists the nine game rules. The rules were designed to provide a certain common structure but not explicitly tell players what to do concerning decisions about economics, politics or pollution. The short rules get the players rapidly involved and may be changed or altered by the players once the game is underway.

The game's five visible components are the game

board (Appendix B), individual role cards (Appendix C), event cards (Appendix D), tokens (Appendix E), and dice. These visible elements are manipulated to produce interaction and decision making about what happens on the board and between individuals or groups of players.

DEFINITION OF TERMS

Gamemaster - Individual who reads the rules, shuffles the event cards, organizes the game board and controls the game tokens.

Game Board - Any combination of eight by eleven inch, plastic-coated cards, grided into one inch squares with intersecting black lines.

Role Cards - Eight by eleven inch cards retained by players throughout the game with directions for players and gamemaster.

Token - One inch cardboard squares representing money, pollution, votes, individual improvements, group improvements, community improvements, economic products and businesses.

Die - Cube numbered one through six thrown in turn or at random by players.

Turn - One die roll.

Round - One circuit of twelve squares on the role card timing circuit.

Town Meeting - A discussion and vote among players on a community improvement suggested by an event card.

MODEL COMPONENTS

Game Board

The game board is the common visible game element. This board provides a centrus for the players and graphically depicts the community they make. The board consists of four, plastic-coated, eight by eleven inch cards grided with one inch squares. One to four or more, of the cards can be attached together in any arrangement using plastic tape. The number and arrangement of cards in relation to the number of players effects the spatial environment and pollution levels of the community.

Players may initially locate natural and artificial features on the board using watercolor marking pencils of different colors. Players then locate their houses, businesses, trees, grass, air pollution, water pollution and community improvement tokens on the game board. Thus, the board becomes a graphic representation of the condition of the community. The watercolor markings may be removed with a wet towel after each game and the game board reused.

Role Chart

The role chart shows the thirty-three players of

the game "Community" (Appendix C). The players' roles for the game are chosen by following the lines of the chart in a clockwise progression outward from the grocer. The doctor's role can be used at any time in the game, however, the event cards concerning health services must be removed or added according to whether the doctor's role is used. The players in the four quadrants of the chart combine to make food, housing, automobile and clothing industries. All roles in one industry are interrelated economically and the four industries are interrelated through the four selling roles of grocer, realtor, car dealer and clothier. The roles must be added in clockwise order according to the number of players for the economic functions of the game to balance.

The four industries and their appropriate roles were selected to depict the selling, distribution, processing and raw material production facets of business. Food, housing, automobile, and clothing businesses were regarded as the most common and necessary businesses in communities.

The number of player roles were designed for use by any number of players from four to thirty-three. Thus, providing a wide range of applications from small parlor groups to large school classes.

Role Cards

Each of the thirty-three role cards (Appendix C) consists of seven parts: Assets give the player certain materials to initially start the game (money tokens, capital investment), Debits describe what the player pays to other players in the game, Income tells what amount and from whom the player receives money, Votes show the initial political power of the individual, Pollution notes how many tokens he must place on the board when he pollutes, Die Roll numbers show what action the player must take according to his roll of the die, Timing Circuit Squares provide a random, structured time for collecting income and placing pollution tokens on the board.

While the game board illustrates spatial relationships, pollution levels, individual and community improvements; the role card provides motor participation through die rolling, movement around a circuit, token interchange, and event card selection. This motor movement is structured and provides a regular movement of money in the economy, a regular sequence of pollution, and actions of chance fate. These actions present the players with challenges of a lack or surplus of money, too much pollution, and a need for individual and group decision making concerning event card demands and opportunities. The role card thus initiates the action needed to affect the game board.

Event Cards

The event cards provide a random chance element interrelated to the role cards and game board. Through event cards money is given or taken from players, opportunities are presented to gain political power, and issues are raised for a group vote.

There are three types of event cards. Reward and penalty event cards give or take players' money according to whether they have participated in the community's economic buying and selling. Opportunity event cards give players a chance to gain votes or money if they have done something to help improve the community. Community improvement event cards call for a vote on community improvements on sanitation, health, education, recreation, or transportation. The player who draws the community improvement event card serves as the moderator of the discussion and all players vote by throwing their vote tokens in a yes or no pile. The gamemaster then counts the votes, announces the decision of the group, returns the votes, and collects the money from the players for the community improvement.

Event cards provide the major impetus for decision making in the game of "Community". These decisions are interrelated to the players' economic, political and personal positions. An individual must decide on his actions

using economic and political facts and plan a strategy to make the community the way he would like it.

Tokens

While the game board is a visible centrus for the players and the role cards and event cards the visible basis for individual actions; the tokens are the means of visible interchange or communication among the players. Tokens include money in $25, $50, $100 and $500 denominations; products such as food, housing, automobiles and clothing; air and water pollution; votes; businesses; individual, group and community improvements. (Appendix E).

An initial number of tokens is given to the players by the gamemaster according to the individual player's role card. Each player gets a certain amount of money, one vote, and enough pollution tokens for several rounds. Players who perform a selling function are given the appropriate thirty-three product tokens. Business owners are given business tokens that are placed on the game board to indicate their place of business. These business tokens may be mortgaged for the amount of money stated on the token.

The gamemaster must supply players with pollution tokens, welfare monies, individual, group or community improvement tokens and tokens or money called for by the die rolls or event cards throughout the game.

Individual, Group and Community Improvements

Three types of improvements may be made by players. An individual player may purchase or obtain tokens that will effect the pollution, economics or politics of the community. Two or more players may group together to gain votes to effect some change in the community and all community players may vote to implement a major community improvement in the areas of sanitation, health, education, recreation, or transportation.

The improvements are the climaxing elements of the game. Without individual, group or community improvements the players will shortly extinct themselves through over pollution of air or water. With improvements the players can make positive visible change in the game board. The culmination of the game is the number and type of community improvements the players can develop in an assigned time span, or in a given number of rounds.

MODEL OPERATION

Many variations will be noted in operating the model. Individuals and groups approach situations in different ways. Some groups might require a more detailed initial explanation of the game and its rules, while other groups launch into the game and modify it as they progress through playing. It is the author's belief that players should be given a mini-

mum amount of rules; and if more detailed rules are requested, to subject the request for rules to group discussion and modification. Thus, if a player wants to know where to place or arrange the game board, he and other players should be asked for their ideas.

A number of alternatives for organizing the game board are possible. The grid cards may be taped together in long or short rectangles or in varying juxtopositions. Rivers, lakes, swamps, forests, roads or deserts may be drawn anywhere on the cards. One card can be used for four to eight players, two cards for nine to sixteen, three for seventeen to twenty-four, or four for twenty-four to thirty-three.

Players who draw only a small body of water on the cards face immediate water pollution problems and those who use only one card for eight players can also face pollution problems due to the lack of the playing board's ability to absorb air and water pollution. Players learn varying approaches to game board organization after several plays and realize that a smaller game board results in more urban congestion than a large more rural board. Players are encouraged to be creative and use the water color markers freely.

Players' roles must be selected according to the role chart for the game's economy to operate satisfactorily.

Following an outward clockwise progression from the grocer on the role chart, any number of players can be added to and beyond the maximum thirty-three, if players wish to create their own role cards.

The games optimum size is related to the experience and creativity of the players. Less than four players cannot operate the economic process satisfactorily. More than sixteen players create a situation in which players are continually placing and removing tokens from the board, exchanging money and drawing event cards. The economic token sellers find it difficult to collect incomes and industry chains start acting as units instead of individuals. The political process with larger groups also does not allow time for everyone to talk as long as they might like and pollution becomes an immediate problem. However, a large number of players also have many more resources to use in solving problems

A player may assume the gamemaster's role with a small group but he will find it increasingly difficult to play and be gamemaster as the group gets larger. For more than eight players, one person would probably not play a role and act only as gamemaster due to the volume of token exchange.

Each person has a die to roll. In a small group the die may be rolled in turn, however, in a large group

players may roll the die as fast as they desire. More rolls allow them to collect money faster, but also increase pollution.

Short term solutions to pollution can be found in individual improvements; but long term solutions must come through the passage of community improvements for sanitation. By combining these community improvements players can reach a zero pollution level. If extinction becomes too imminent the event card calling for a community improvement on sanitation can be pulled from the event card deck and discussed or community improvements might remain an open issue subject to debate and passage at any time in the game.

Pollution and economics appear of prime importance to the players. With a large group new economic and industry alignments may come about through players switching industries, raising the prices of goods or withholding goods and purchases to affect other players. These modifications of the rules are allowable, as players soon see the results of their actions when an inflated or unbalanced economy falters or collapses.

Political power can become a quest for some players. These players can accumulate votes using the legal means of group improvements, event cards or personal leadership. Some players have used economic pressure to gather votes, but this is not encouraged.

The location of houses and businesses on the board also produces variations. The players initially locate their house or business on the game board, but as the game progresses and one area becomes more polluted or another area has more trees, players decide they want to move. Some games result in players selling or switching their houses. Players may switch houses, but businesses should remain in their initial location.

Most players initially involve themselves in the die rolling, economic, pollution and game board organization. They later realize the opportunities for individual improvements, group improvements and community improvements after exposure to event cards calling for these actions. Some players may continue operating only on the economic and pollution levels while others start making small individual and group improvements. Eventually most players see beyond the economy and pollution into the political process of making community improvements. When an event card calling for a community improvement is first drawn it may be voted down due to economic reasons; but, as money accumulates in the community more improvements are voted. Since the player drawing the event card acts as moderator of the discussion and vote, very often his attitude and leadership capabilities influence the outcome of community issues. The gamemaster can perform the function of moder-

ator if the players are very young or inexperienced; however, most players can develop into competent moderators.

Players are puzzled that the game has no final end-point and stresses cooperation rather than competition. The game can be ended negatively by pollution, but the game generally ends with one or two issues passed by the players.

The game of "Community" requires two or more hours of play to get into the game's full process. Players appear to enjoy the process and want to play the game again. The game is unique because the board outcome and the process are never the same and thus present a new situation each play.

Chapter 6

PARTICIPANT REACTIONS

The game has been played with several age groups of varying sizes. Three groups were taken as illustrative of participant reactions: a twelve year old and under group, a teenage group and an adult age group.

The youngest group of players concentrated on buying and receiving money and products. They attempted to follow the rules closely, but did not use the group and individual improvements frequently. The players were more interested in gaining money than gathering votes, although they did note pollution problems and attempted some action under the guidance of an older gamemaster.

The teenage group followed the rules less strictly. Economic buying and selling was of major importance; however, political vote gaining was attempted more often and individual improvements were made more frequently than with the younger group. Community issues were discussed and voted on with the guidance of the gamemaster.

The adult group concentrated less on gaining money and more on gaining votes than the younger groups. Individual improvements were used more frequently and community improvements were discussed more readily.

Reactions about the game were solicited from the players. They noted the need for all community members to purchase economic products and generate enough money for all players to operate successfully in the game. Pollution was felt to occur too rapidly and more methods of pollution control were suggested. Some players thought too many town meetings were called, while others thought there were too few. Players said they needed more time for discussion of community issues. With over thirty roles in operation the players noted some confusion in keeping track of economic buying and selling. In a large group the event cards were drawn very quickly and the disbursement of tokens for individual and group improvements, pollution tokens, and tokens called for by the die rolls and event cards kept the gamemaster constantly busy with a backlog of requests.

In general the participant reactions were very positive toward the game and its process. The players said that they would like to play the game again and groups that played the game more than once appeared to enjoy the process and showed a greater knowledge of the game's organization and possibilities particularly in the area of community improvements. Players with a familiarity of the game also enjoyed experimenting with different approaches and interactions for dealing with pollution, politics and economics. The game became much more creative with players becoming

more active in their role playing.

Discussions with players further developed their ideas about community action concerning community improvements and the initial game play, repetition and discussion of community situations indicated that players reacted favorably and gained some knowledge and insights into community processes and their interrelationships.

Chapter 7

CONCLUSION

The purpose of the thesis was to produce a new method for encouraging environmental awareness and action. After reviewing materials a simulation game was developed with learning objectives centered on developing individual and group interaction concerning economic, political and pollution activities. A role playing economic context was developed in which players acted in selling, distribution, processing and production roles in four industries. Political vote gaining and polling procedures were built into the game through event cards, group and community improvements. Pollution awareness was developed in the game through use of a game board, pollution tokens and tokens that described methods people might use to limit pollution.

During the operation of the game, players interacted with one another concerning economic buying and selling; vote gaining and polling; and pollution production and reduction. The players interacted with each other as individuals and as groups in organizing the game board and using economic, political and pollution tokens. They became involved in buying individual and group improvements; gaining votes; and discussing and voting on community

improvements. They became very involved in sales, distribution, production and processing roles and realized that to operate the game successfully they needed each player's consideration and cooperation.

The game is unique because of its thirty-three individual roles for players and its variable game board. It has commonalities with other games in its use of dice and event cards. Its limitations arise from the time needed to play the game and the number of players needed to successfully operate a community.

While the author has achieved some realistic balance in the economy, politics, and pollution levels of the game using a variable payment scale for services and improvements, the game still needs further development in proposing alternate ways of economic, political and pollution operations. Additional research is also needed concerning the effect of simulation games on players subsequent attitudes and behaviors. Players appear to enjoy playing the game and use group processes and individual actions to gain new insights into community decision making concerning economics, politics and pollution.

A version of the game has been produced by Virginia Polytechnic Institute and 4-H for use in the United States. Through further play and development the game will hopefully prove of use in altering people's attitudes positively

toward environmental action.

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APPENDIX A

GAME RULES

1. Select one player to be gamemaster. This player:

   A. Reads the rules to the players.

   B. Leads the players in organizing the game board.

   C. Hands out roles according to the role chart.

   D. Shuffles and stacks event cards beside the game board.

   E. Controls money, tokens, and other game materials throughout the game.

2. The gamemaster and players:

   A. Connect pieces of game board together with plastic tape and use watercolor markers to draw in rivers, lakes, mountains, swamps, deserts, roads or other features that are desired (Appendix B).

   B. Consult the role chart and select player roles by moving clockwise along the lines outward from the grocer (Appendix C). The doctor's role can be used at any time.

   C. Shuffle and place event cards beside the board (Appendix D).

3. Starting with the grocer, each player:

   A. Consults his role card and gets from the gamemaster his initial assets, one red vote token, and any number of pollution tokens. If he owns a business he locates his business token on the board.

   B. Rolls the die and acts according to the corresponding number listed on his role card.

   C. Moves clockwise around the timing circuit on his role card according to the number of the die.

   D. Collects money from the appropriate players and places pollution tokens on the game board when he passes over the squares marked collect and pollute.

4. Players who perform a selling function (grocer, realtor, car dealer, clothier, doctor) collect money for their appropriate tokens when they pass over the collect

square on their role card. Other players who have bought an economic product token (food, housing, automobile, clothing or health card) must pay the original seller $50 at this time or forfeit the token to the seller (Appendix E).

5. Individual players can buy individual improvement tokens (Appendix E).

6. Two or more players can buy group improvement tokens (Appendix E).

7. Players must vote on the community improvements presented by the event cards. They vote by casting their red vote tokens for yes or no. The tokens are counted by the gamemaster and if the vote is yes the players must decide on how to pay for the community improvement. Players retain their vote tokens throughout the game (Appendix E).

8. The game ends when air pollution tokens cover all the open squares of the land and or water pollution tokens cover all the open squares on bodies of water marked on the board.

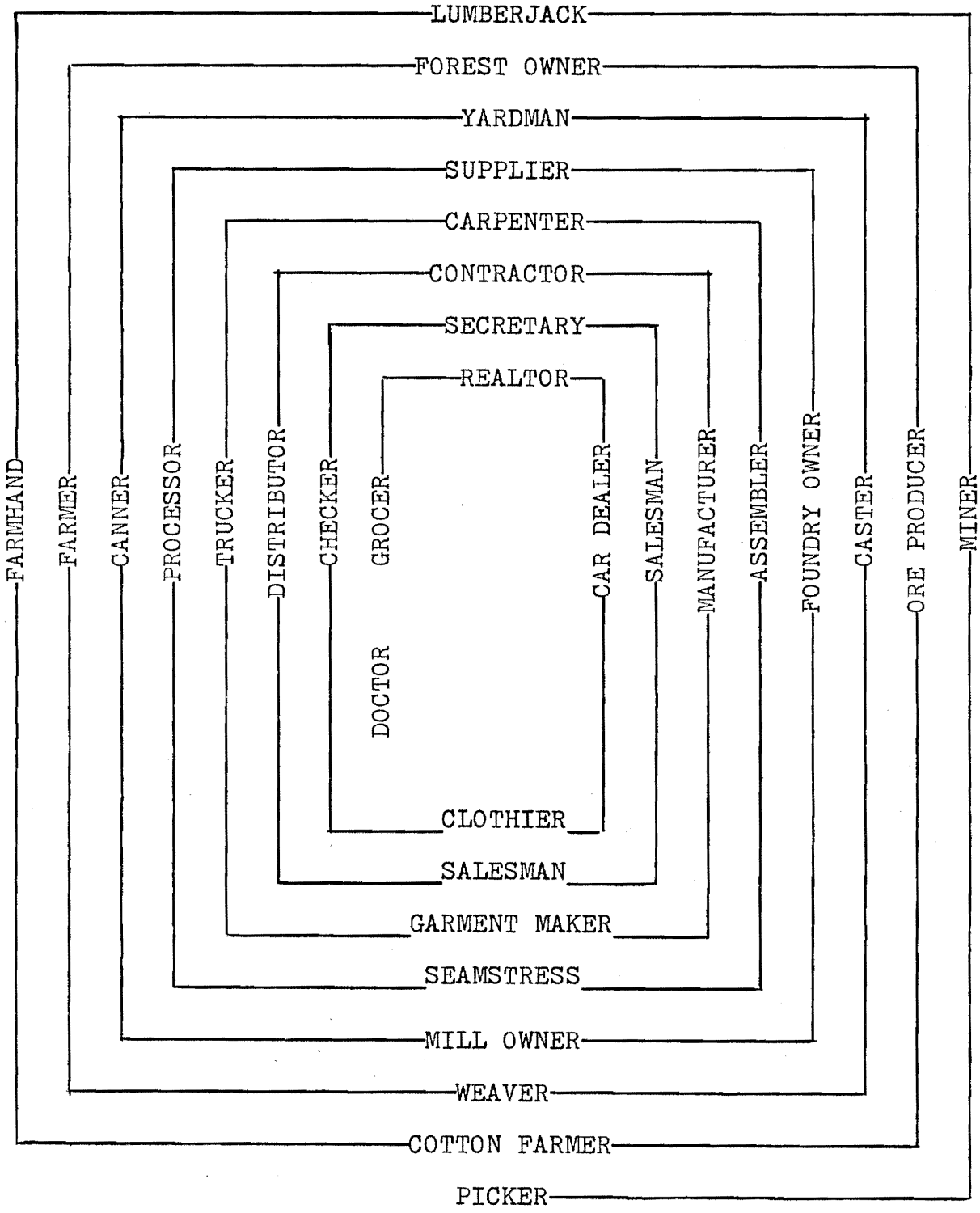
9. Players win when they have made their community the way they like it.

APPENDIX B

GAME BOARD

APPENDIX C

PLAYER ROLES


LUMBERJACK
FOREST OWNER
YARDMAN
SUPPLIER
CARPENTER
CONTRACTOR
SECRETARY
REALTOR
FARMHAND
FARMER
CANNER
PROCESSOR
TRUCKER
DISTRIBUTOR
CHECKER
GROCER
DOCTOR
CAR DEALER
SALESMAN
MANUFACTURER
ASSEMBLER
FOUNDRY OWNER
CASTER
ORE PRODUCER
MINER
CLOTHIER
SALESMAN
GARMENT MAKER
SEAMSTRESS
MILL OWNER
WEAVER
COTTON FARMER
PICKER

GROCER

ASSETS: Grocery store with mortgage value of $4000
$500 cash
34 food cards

DEBITS: Pays checker $50 per round
Pays distributor $200 when 10-13 players
$300 when 14-17 players
$500 when 18-21 players
$700 when 22-25 players
$900 when 26-29 players
$1100 when 30-33 players

INCOME: $50 a round from each player for a food card

VOTES: 1

POLLUTION: Air: 2 Water: 2

DIE ROLL:
1. GRUNCHLA "Cereal that makes you feel like a Gorilla" sales boom and you make $100
2. High prices make customers eat smaller steaks and you lose $50
3. Event card
4. Event card
5. Event card
6. Whipped cream sales explode and you make $100

TIMING CIRCUIT:

Pollute					
					Collect

CHECKER

ASSETS: $200 cash

DEBITS:

INCOME: $50 per round from grocer
$100 in welfare payments per round from game bank

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. Sell rare coin found in cash register and make $100
2. You ride grocery cart into car and pay $25 damages
3. Event card
4. Event card
5. Event card
6. For being extra helpful a customer gives you a $100 bill

TIMING CIRCUIT:

Pollute					
					Collect

DISTRIBUTOR

ASSETS: Warehouse with mortgage value of $4000
$500 cash

DEBITS: Pays trucker $100
Pays processor $150 when 22-25 players
$300 when 26-29 players
$500 when 30-33 players

INCOME: $200 from grocer when 10-13 players
$300 from grocer when 14-17 players
$500 from grocer when 18-21 players
$700 from grocer when 22-25 players
$900 from grocer when 26-29 players
$1100 from grocer when 30-33 players

VOTES: 1

POLLUTION: Air: 3 Water: 3

DIE ROLL:
1. New truck carries more food and you make $100
2. Air conditioned truck breaks down and food rots losing you $50
3. Event card
4. Event card
5. Event card
6. New fuchsia warehouse impresses clients and you make $100

TIMING CIRCUIT:

Pollute					
					Collect

TRUCKER

ASSETS: $200 cash

DEBITS:

INCOME: $100 per round from distributor
$100 from game bank for short hauls

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. Snake eye you lose $50
2. Secret fast route around city makes you $100
3. Event card
4. Event card
5. Event card
6. You have 100% safety record and receive $100 award.

TIMING CIRCUIT:

Pollute					
					Collect

PROCESSOR

ASSETS: Factory with mortgage value of $4000
$500 cash

DEBITS: Pays canner $50 per round
Pays farmer $250 per round

INCOME: $150 from distributor when 22-25 players
$300 from distributor when 26-29 players
$500 from distributor when 30-33 players

VOTES: 1

POLLUTION: Air: 4 Water: 4

DIE ROLL:
1. New chicken liver soup sales boom and you make $100
2. Squash cereal doesn't make it and you lose $50
3. Event card
4. Event card
5. Event card
6. You manufacture a new secret product and make $100

TIMING CIRCUIT:

Pollute					
					Collect

CANNER

ASSETS: $200 cash

DEBITS:

INCOME: $50 per round from processor
$100 in welfare payments per round from game bank

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. You discover new way of packaging chicken and make $100
2. You drop keys in can of noodle soup and lose $50
3. Event card
4. Event card
5. Event card
6. You find diamond wristwatch in tomato you are peeling and make $100

TIMING CIRCUIT:

Pollute					
					Collect

FARMER

ASSETS: Farm with mortgage value of $4000
$500 cash

DEBITS: Pays farmhand $50

INCOME: $250 from processor

VOTES: 1

POLLUTION: Air: 5 Water: 5

DIE ROLL:
1. Secret fertilizer enables you to grow more tomatoes and you make $100
2. Strange crop disease causes you to lose $50
3. Event card
4. Event card
5. Event card
6. High speed tractor enables you to plow more area and you make $100

TIMING CIRCUIT:

Pollute					
					Collect

FARMHAND

ASSETS: $200 cash

DEBITS:

INCOME: $50 per round from farmer
$100 in welfare payments per round from game bank

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. While plowing you find a jar of old coins and you make $100
2. You get sleepy and fall off tractor losing $50 out of your pocket in a furrow.
3. Event card
4. Event card
5. Event card
6. You find a secret way to plow a field in half the time and make $100

TIMING CIRCUIT:

Pollute					
					Collect

REALTOR

ASSETS: Office and land with mortgage value of $4000
$500 cash
34 housing payment cards

DEBITS: Pays secretary $50
Pays contractor $200 when 10-13 players
$300 when 14-17 players
$500 when 18-21 players
$700 when 22-25 players
$900 when 26-29 players
$1100 when 30-33 players

INCOME: $50 a round from each player for a housing card if player has a house

VOTES: 1

POLLUTION: Air: 2 Water: 2

DIE ROLL:
1. Housing sales boom and you make $100
2. Roofing falls on prospective customer and you lose $50
3. Event card
4. Event card
5. Event card
6. Unusual advertising campaign gets customers and you make $100

TIMING CIRCUIT:

Pollute					
					Collect

SECRETARY

ASSETS: $200 cash

DEBITS:

INCOME: $50 per round from realtor
$100 in welfare payments per round from game bank

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. You win prize in contest and make $100
2. You drop typewriter on floor and lose $50
3. Event card
4. Event card
5. Event card
6. You type thesis for hard working graduate student and make $100

TIMING CIRCUIT:

Pollute					
					Collect

CONTRACTOR

ASSETS: Equipment with mortgage value of $4000
$500 cash

DEBITS: Pays carpenter $100
Pays supplier $150 when 22-25 players
$300 when 26-29 players
$500 when 30-33 players

INCOME: $200 from realtor when 10-13 players
$300 from realtor when 14-17 players
$500 from realtor when 18-21 players
$700 from realtor when 22-25 players
$900 from realtor when 26-29 players
$1100 from realtor when 30-33 players

VOTES: 1

POLLUTION: Air: 3 Water: 3

DIE ROLL:
1. You can build houses faster using a new type of nail and make $100
2. Your equipment breaks down and you lose $50
3. Event card
4. Event card
5. Event card
6. New plumbing system saves time and you make $100

TIMING CIRCUIT:

Pollute					
					Collect

CARPENTER

ASSETS: $200 cash

DEBITS:

INCOME: $100 per round from contractor
$100 from game bank for independent work

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. You use a new power hammer to nail faster and make $100
2. A keg of nails falls on your foot and you lose $50
3. Event card
4. Event card
5. Event card
6. You discover a new way of framing walls and make $100

TIMING CIRCUIT:

Pollute					
					Collect

SUPPLIER

ASSETS: Lumber yard with mortgage value of $4000
$500 cash

DEBITS: Pays yardman $50 per round
Pays forest owner $250 per round

INCOME: $150 from contractor when 22-25 players
$300 from contractor when 26-29 players
$500 from contractor when 30-33 players

VOTES: 1

POLLUTION: Air: 4 Water: 4

DIE ROLL:
1. You stock an unusually high grade of lumber and make $100
2. Thirty days of heavy rain on yard loses you $50
3. Event card
4. Event card
5. Event card
6. Secret method of stocking yard makes you $100

TIMING CIRCUIT:

Pollute					
					Collect

YARDMAN

ASSETS: $200 cash

DEBITS:

INCOME: $50 per round from supplier
$100 in welfare payments per round from game bank

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. You win a magazine contest and make $100
2. You break fork lift and lose $50
3. Event card
4. Event card
5. Event card
6. You think of new way of stocking yard and make $100

TIMING CIRCUIT:

Pollute					
					Collect

FOREST OWNER

ASSETS: Timberland with mortgage value of $4000
$500 cash

DEBITS: Pays logger $50

INCOME: $250 from supplier

VOTES: 1

POLLUTION: Air: 5 Water: 5

DIE ROLL:
1. Your soil produces rapid growth of pine trees and you make $100
2. Forest fire loses you $50
3. Event card
4. Event card
5. Event card
6. New type of seedling increases yield and you make $100

TIMING CIRCUIT:

Pollute					
					Collect

LUMBERJACK

ASSETS: $200 cash

DEBITS:

INCOME: $50 per round from forest owner
$100 in welfare payments per round from game bank

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. New type of power saw enables you to cut trees faster and you make $100
2. You saw down wrong trees and lose $50
3. Event card
4. Event card
5. Event card
6. You and your buddy find new ways to saw lumber and you make $100

TIMING CIRCUIT:

Pollute					
					Collect

CLOTHIER

ASSETS: Clothing store with mortgage value of $4000
$500 cash
34 clothing cards

DEBITS: Pays salesman $50
Pays garment maker $200 when 10-13 players
$300 when 14-17 players
$500 when 18-21 players
$700 when 22-25 players
$900 when 26-29 players
$1100 when 30-33 players

INCOME: $50 per round from each player for a clothing card

VOTES: 1

POLLUTION: Air: 2 Water: 2

DIE ROLL:
1. New style coats sell like hotcakes and you make $100
2. Moths eat wool clothes and you lose $50
3. Event card
4. Event card
5. Event card
6. New window display attracts customers and you make $100

TIMING CIRCUIT:

Pollute					
					Collect

SALESMAN

ASSETS: $200 cash

DEBITS:

INCOME: $50 per round from clothier
$100 in welfare payments per round from game bank

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. Customer likes you so well that he gives you $100
2. You forget and lock customer in change room area and lose $50
3. Event card
4. Event card
5. Event card
6. New window display wins national award and you make $100

TIMING CIRCUIT:

Pollute					
					Collect

GARMENT MAKER

ASSETS: Factory with mortgage value of $4000
$500 cash

DEBITS: Pays seamstress $50 per round
Pays mill owner $150 when 22-25 players
$300 when 26-29 players
$500 when 30-33 players

INCOME: $200 from clothier when 10-13 players
$300 from clothier when 14-17 players
$500 from clothier when 18-21 players
$700 from clothier when 22-25 players
$900 from clothier when 26-29 players
$1100 from clothier when 30-33 players

VOTES: 1

POLLUTION: Air: 3 Water: 3

DIE ROLL:
1. You find way of cutting more pattern pieces out of material and make $100
2. Your pattern cutting machine breaks down and you lose $50
3. Event card
4. Event card
5. Event card
6. You design new dress pattern and make $100

TIMING CIRCUIT:

Pollute					
					Collect

SEAMSTRESS

ASSETS: $200 cash

DEBITS:

INCOME: $50 per round from garment maker
$100 in welfare payments per round from game bank

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. You learn new and faster method of using sewing machine and make $100
2. Your fingers get sore and you work slower losing $50
3. Event card
4. Event card
5. Event card
6. You win seamstress sewing contest and make $100

TIMING CIRCUIT:

Pollute					
					Collect

MILL OWNER

ASSETS: Factory with mortgage value of $4000
$500 cash

DEBITS: Pays weaver $50 per round
Pays cotton farmer $250 per round

INCOME: $150 from garment maker when 22-25 players
$300 from garment maker when 26-29 players
$500 from garment maker when 30-33 players

VOTES: 1

POLLUTION: Air: 4 Water: 4

DIE ROLL:
1. You use new thread and make $100
2. Your loom breaks down and you lose $50
3. Event card
4. Event card
5. Event card
6. New material you make sells rapidly and you make $100

TIMING CIRCUIT:

Pollute					
					Collect

WEAVER

ASSETS: $200 cash

DEBITS:

INCOME: $50 per round from mill owner
$100 in welfare payments per round from game bank

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. You suggest new method for weaving and make $100
2. Your warp and woof are messed up and you lose $50
3. Event card
4. Event card
5. Event card
6. You win contest and make $100

TIMING CIRCUIT:

Pollute					
					Collect

COTTON FARMER

ASSETS: Cotton plantation with mortgage value of $4000
$500 cash

DEBITS: Pays picker $50 per round

INCOME: $250 from mill owner

VOTES: 1

POLLUTION: Air: 5 Water: 5

DIE ROLL:
1. New strain of cotton makes you $100
2. Boll weevil gets into cotton and you lose $50
3. Event card
4. Event card
5. Event card
6. Your daughter is named cotton bowl princess and you make $100

TIMING CIRCUIT:

Pollute					
					Collect

PICKER

ASSETS: $200 cash

DEBITS:

INCOME: $50 per round from cotton farmer
$100 in welfare payments per round from game bank

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. You win cotton picking contest and make $100
2. You lose your wallet in the mechanized picker and lose $50
3. Event card
4. Event card
5. Event card
6. Six is your luckey number and you make $100

TIMING CIRCUIT:

Pollute					
					Collect

CAR DEALER

ASSETS: Showroom with mortgage value of $4000
$500 cash
34 mobility cards

DEBITS: Pays salesman $50 per round
Pays manufacturer $200 when 10-13 players
$300 when 14-17 players
$500 when 18-21 players
$700 when 22-25 players
$900 when 26-29 players
$1100 when 30-33 players

INCOME: $50 per round from each player with an automobile

VOTES: 1

POLLUTION: Air: 2 Water: 2

DIE ROLL:
1. Your economy car sales boom and you make $100
2. You are involved in a wreck and lose $50
3. Event card
4. Event card
5. Event card
6. Your mechanics are the best in town and you make $100

TIMING CIRCUIT:

Pollute					
					Collect

SALESMAN

ASSETS: $200 cash

DEBITS:

INCOME: $50 per round from car dealer
$100 in welfare payments per round from game bank

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. You win salesman of the month award and make $100
2. You make customer angry and lose $50
3. Event card
4. Event card
5. Event card
6. New compact car sales make you $100

TIMING CIRCUIT:

Pollute					
					Collect

MANUFACTURER

ASSETS: Factory with mortgage value of $4000
$500 cash

DEBITS: Pays assembler $100
Pays foundry owner $150 when 22-25 players
$300 when 26-29 players
$500 when 30-33 players

INCOME: $200 from car dealer when 10-13 players
$300 from car dealer when 14-17 players
$500 from car dealer when 18-21 players
$700 from car dealer when 22-25 players
$900 from car dealer when 26-29 players
$1100 from car dealer when 30-33 players

VOTES: 1

POLLUTION: Air: 3 Water: 3

DIE ROLL:
1. Your assembly line moves faster because of happy workers and you make $100
2. Your workers go out on strike and you lose $50
3. Event card
4. Event card
5. Event card
6. Your new style economy car makes you $100

TIMING CIRCUIT:

Pollute					
					Collect

ASSEMBLER

ASSETS: $200 cash

DEBITS:

INCOME: $100 per round from manufacturer
$100 from game bank for odd jobs

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. You win a contest and make $100
2. You drop tools in assembly line and lose $50
3. Event card
4. Event card
5. Event card
6. You are the best assembler around and make $100

TIMING CIRCUIT:

Pollute					
					Collect

FOUNDRY OWNER

ASSETS: Foundry with mortgage value of $4000
$500 cash

DEBITS: Pays caster $50 per round
Pays ore producer $250 per round

INCOME: $150 from manufacturer when 22-25 players
$300 from manufacturer when 26-29 players
$500 from manufacturer when 30-33 players

VOTES: 1

POLLUTION: Air: 4 Water: 4

DIE ROLL:
1. You discover a new alloy and make $100
2. Complicated casting breaks and you lose $50
3. Event card
4. Event card
5. Event card
6. You win foundry man of the year award and make $100

TIMING CIRCUIT:

Pollute					
					Collect

CASTER

ASSETS: $200 cash

DEBITS:

INCOME: $50 per round from foundry owner
$100 in welfare payments per round from game bank

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. You make $100 for new design of casting
2. You drop molten metal on shop plans and lose $50
3. Event card
4. Event card
5. Event card
6. You are winner of friday night church bingo game and get $100

TIMING CIRCUIT:

Pollute					
					Collect

ORE PRODUCER

ASSETS: Mine with mortgage value of $4000
$500 cash

DEBITS: Pays miner $50 per round

INCOME: $250 from foundry owner

VOTES: 1

POLLUTION: Air: 5 Water: 5

DIE ROLL:
1. You get new efficient machinery and make $100
2. New mine undercuts you and you lose $50
3. Event card
4. Event card
5. Event card
6. Find uranium deposit while mining for ore, receive $100 from game bank

TIMING CIRCUIT:

Pollute					
					Collect

MINER

ASSETS: $200 cash

DEBITS:

INCOME: $50 per round from ore producer
$100 in welfare payments per round from game bank

VOTES: 1

POLLUTION: Air: 1 Water: 1

DIE ROLL:
1. You find gold nugget in mine and make $100
2. Lead miner's strike against town-hit mayor with shovel and lose $50 in damages
3. Event card
4. Event card
5. Event card
6. Moonlight as rent-a-cop in local beanery, get $100

TIMING CIRCUIT:

Pollute					
					Collect

DOCTOR

ASSETS: Office with mortgage value of $4000
$500 cash
34 health cards

DEBITS:

INCOME: $50 per round from each player for health card

VOTES: 1

POLLUTION: Air: 2 Water: 2

DIE ROLL:
1. New diagnosis equipment brings in more patients and you make $100
2. Your office is broken into and you lose $50
3. Event card
4. Event card
5. Event card
6. You deliver four babies over the weekend and make $100

TIMING CIRCUIT:

Pollute					
					Collect

APPENDIX D

EVENT CARDS

Each paragraph represents one event card. This paragraph is glued to a three by five inch card and the cards are shuffled and stacked beside the game board.

You get a life insurance refund of $25 if you have purchased a health card.

You get a fire insurance refund of $50 if you have purchased a housing card.

You win a sweepstakes from the Kleeno soap Company for $1000 if you have a food card.

You win $500 in the Lucky License Plate contest if you have an automobile card.

You receive $100 as winner of the best dressed in town contest if you have a clothing card.

You are fined $100 for indecent exposure if you do not have a clothing card.

You lose $50 for being late to work if you do not have an automobile card.

You are arrested for vagrancy and pay a fine of $100 if you donot have a housing card.

You are caught stealing hamburgers and pay a fine of $100 if you do not have a food card.

You have to pay $150 in medical fees if you do not have a health card.

You can sponsor a scout troop for $50 and receive one vote.

You can organize a 4-H club and receive one vote. You must have a car token.

You can participate in an ecology club and receive one vote if you have planted two tree tokens.

You can head a clean-up committee and receive one vote if you have a biodegradable or reusuable product token.

You can sponsor a bicycle club and receive one vote if you have a bicycle token.

You can participate in a sport and make $1000 if you have a recreation area.

You can discover a new medical treatment and make $500 if you have a health facility.

You can lead a population control group and receive one vote if you have a birth control token.

You can receive one vote in the most beautiful lawn contest if you have planted two grass tokens.

A federal program gives you $1000 and you get two votes if you have a sanitation system in your community.

You receive $1000 from the Fort Fund and gain two votes if you have a transportation system in your community.

You receive $1000 from the Matt Foundation and two votes if you have a community school in your community.

Town Meeting on Sanitation.

Town Meeting on Health

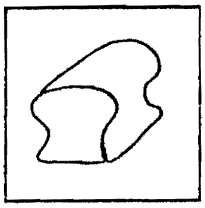
Town Meeting on Education.

Town Meeting on Recreation.

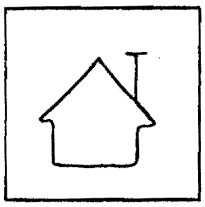
Town Meeting on Transportation.

APPENDIX E

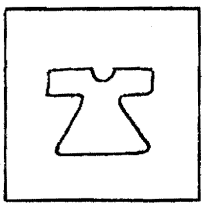
TOKENS



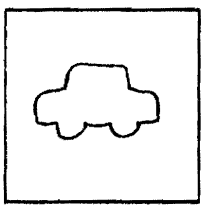
Food token: may be bought initially from grocer for $50 must pay $50 each round to retain possession of token.



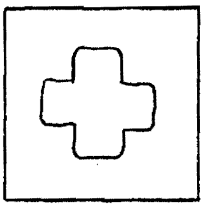
Housing token: may be bought initially from realtor for $50 must pay $50 each round to retain possession of token.



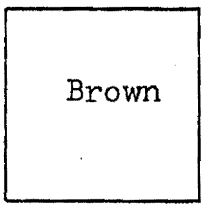
Clothing token: may be bought initially from clothier for $50 must pay $50 each round to retain possession of token.



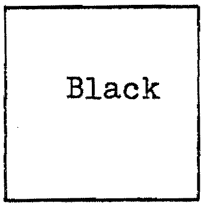
Automobile token: may be bought initially from car dealer for $50 must pay $50 each round to retain possession of token.



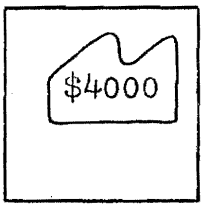
Health token: may be bought initially from doctor for $50 must pay $50 each round to retain possession of token.



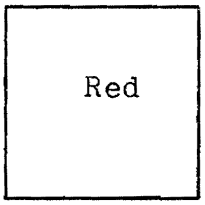
Air pollution token: must be placed each round anywhere on game board except on water or other tokens.



Water pollution token: must be placed each round on water cannot be placed on other tokens.



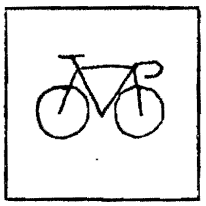
Business token: may be placed anywhere on board and may be mortgaged to gamemaster for stated amount of money.



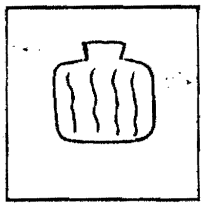
Vote token: is placed on yes or no pile when issue is called to a vote.

Tree token: may be bought from gamemaster for $25 and placed on board to reduce air pollution one point for one round.

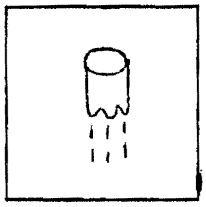
Grass token: may be bought from gamemaster for $25 and placed on board to reduce water pollution one point for one round.



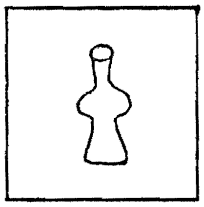
Bicycle token: may be bought from gamemaster for $50 and placed on board to reduce air and water pollution one point for one round.



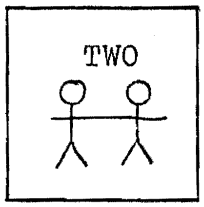
Smog device: may be bought from gamemaster for $25 and and reduces air pollution one point for one round.



Biodegradable product: may be bought from gamemaster for $25 and reduces air pollution one point for one round.



Reusuable product: may be bought from gamemaster for $25 and reduces water pollution one point for one round.



Birth control: may be bought from gamemaster for $50 and reduces air and water pollution one point for one round.

Public service advertisement: may be bought from gamemaster for $50 each player and gives each supporter one vote.

Clean-up drive: may be bought from gamemaster for $75 each person and gives each supporter two votes.

Group Improvement

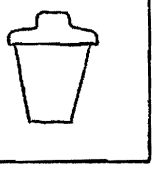
Walk and run for disease prevention: Costs $100 each person, may be bought from gamemaster and gives each supporter three votes.

Group Improvement

Public newsletter on pollution: may be bought from gamemaster for $50 each person and gives each supporter one vote.

Group Improvement

Organize a public service club: may be bought from gamemaster for $50 each person and gives each supporter one vote.

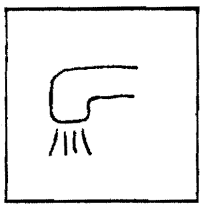


Sanitation Community Improvement for Solid Waste Systems:

Open dump costs $500 for 1 to 16 players. $5000 for 17 to 33 players and reduces air pollution one point per round for each player.

Land fill costs $700 for 1 to 16 players. $7000 for 17 to 33 players and reduces air pollution two points per round for each player.

Reprocessing costs $1000 for 1 to 16 players, $10000 for 17 to 33 players and reduces air pollution three points per round each player.

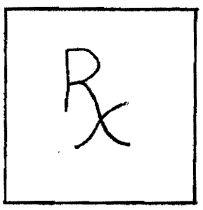


Sanitation Community Improvement for Sewage Systems:

Primary cost $500 for 1 to 16 players, $5000 for 17 to 33 players and reduces water pollution one point per round for each player.

Secondary costs $700 for 1 to 16 players, $7000 for 17 to 33 players and reduces water pollution two points per round for each player.

Tertiary costs $1000 for 1 to 16 players, $10000 for 17 to 33 players and reduces water pollution three points per round for each player.

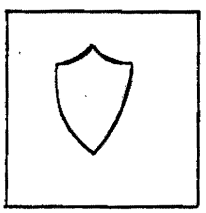


Health Community Improvement for Medical Facilities:

Rescue squad costs $500 for 1 to 16 players, $5000 for 17 to 33 players.

Clinic costs $700 for 1 to 16 players, $7000 for 17 to 33 players.

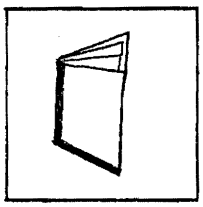
Hospital costs $1000 for 1 to 16 players and $10000 for 17 to 33 players.



Health Community Improvement for Safety Facilities:

Police costs $500 for 1 to 16 players and $5000 for 17 to 33 players.

Fire costs $700 for 1 to 16 players and $7000 for 17 to 33 players.

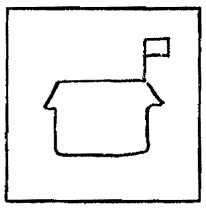


Education Community Improvement for Library and Museum:

Bookmobile costs $500 for 1 to 16 players, $5000 for 17 to 33 players.

Library costs $700 for 1 to 16 players, $7000 for 17 to 33 players.

Museum costs $1000 for 1 to 16 players, $10000 for 17 to 33 players.

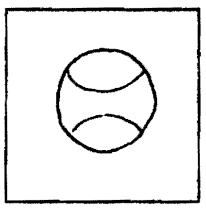


Education Community Improvement for Schools:

Elementary costs $500 for 1 to 16 players and $5000 for 17 to 33 players.

Secondary costs $700 for 1 to 16 players and $7000 for 17 to 33 players.

College costs $1000 for 1 to 16 players and $10000 for 17 to 33 players.

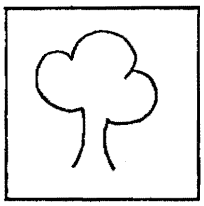


Recreation Community Improvement for Indoor Recreation:

Hall costs $500 for 1 to 16 players and $5000 for 17 to 33 players.

Recreation Center costs $700 for 1 to 16 players and $7000 for 17 to 33 players.

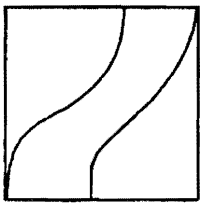
Colliseum costs $1000 for 1 to 16 players and $10000 for 17 to 33 players.



Recreation Community Improvement for Outdoor Recreation:

Playground costs $500 for 1 to 16 players and $5000 for 17 to 33 players.

Park costs $700 for 1 to 16 players and $7000 for 17 to 33 players.

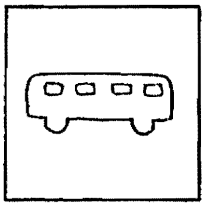


Transportation Community Improvement for Roads:

Dirt costs $500 for 1 to 16 players and $5000 for 17 to 33 players.

Gravel costs $700 for 1 to 16 players and $7000 for 17 to 33 players.

Asphalt costs $100 for 1 to 16 players and $10000 for 17 to 33 players.



Transportation Community Improvement for Mass Transport:

Diesel bus costs $500 for 1 to 16 players and $5000 for 17 to 33 players.

Electric bus costs $700 for 1 to 16 players and $7000 for 17 to 33 players.

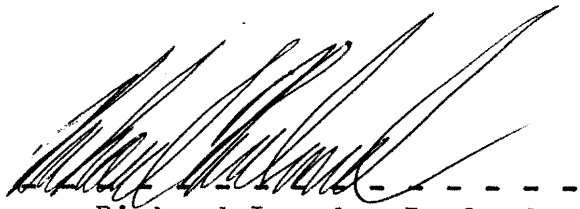
Subway or train costs $1000 for 1 to 16 players and $10000 for 17 to 33 players.

VITA

The author attended Roanoke College in Salem, Virginia and graduated from Brigham Young University in Provo, Utah with a B.A. in History and minors in Archaeology and English. Undergraduate study concentrated on historic cultures' artifacts and communication techniques with the senior thesis on propaganda methods in World War One.

Graduate study at the University of Oregon, Eugene, Oregon; Virginia Commonwealth University, Richmond, Virginia; and at Virginia Polytechnic Institute and State University, Blacksburg, Virginia concentrated on program development and evaluation of adult, extension, and community education.

The author has taught History and English in an independent school and served as a VISTA Volunteer in California and Utah with community and state organizations for adult, juvenile and migrant education. He is currently employed by the Richmond, Virginia Public Schools as school community coordinator for a twenty school area.



Richard Langdon Rowland

COMMUNITY: A SIMULATION GAME FOR ENVIRONMENTAL INVOLVEMENT

by

Richard Langdon Rowland

(ABSTRACT)

The thesis outlines the need for a method of communicating concepts of environmental action, reviews environmental movements and simulation gaming theory, proposes methodology and learning objectives and describes an environmental simulation game named "Community". The game simulates a small town with four industries (food, housing, textile and automobile manufacturing) that employ four to thirty-three players who exchange money, pollute, and vote on community issues. The game rules, playing board, player roles, event cards, tokens, game operation and participant reactions are described.

The conclusion states the game of "Community" represents a design that involved individuals in participatory, decision making situations concerning economic, political and pollution processes. A need is stated for additional research on the effects of simulation gaming.

A bibliography lists sources consulted on environmental movements and simulation gaming. The appendices

contain the game model elements in a playing form. The author's vita notes a university background in history and education with work experience in community organization.