Development of a Simulation Game in the Area of Housing

Beverlee Olson Buenning

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DEVELOPMENT OF A SIMULATION GAME
IN THE AREA OF HOUSING

BY
BEVERLEE OLSON BUENNING

A thesis submitted
in partial fulfillment of the requirements for the
degree Master of Science, Major in
Home Economics Education
South Dakota State University

1974
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DEVELOPMENT OF A SIMULATION GAME

IN THE AREA OF HOUSING

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable for meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Adviser

Head, Home Economics
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BOB
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. INTRODUCTION</strong></td>
<td>1</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>3</td>
</tr>
<tr>
<td>Importance of the Study</td>
<td>4</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>4</td>
</tr>
<tr>
<td>Conceptualization of the Game</td>
<td>4</td>
</tr>
<tr>
<td>Use and Development of Games</td>
<td>5</td>
</tr>
<tr>
<td>Definition of Terms</td>
<td>6</td>
</tr>
<tr>
<td>Organization of the Thesis</td>
<td>7</td>
</tr>
<tr>
<td><strong>2. REVIEW OF LITERATURE</strong></td>
<td>8</td>
</tr>
<tr>
<td>History of Gaming</td>
<td>8</td>
</tr>
<tr>
<td>Advantages of Simulation Gaming as an Instructional Tool</td>
<td>13</td>
</tr>
<tr>
<td>Advantages for Teachers</td>
<td>24</td>
</tr>
<tr>
<td>Limitations of Simulation Gaming as an Instructional Tool</td>
<td>26</td>
</tr>
<tr>
<td>Types of Games</td>
<td>31</td>
</tr>
<tr>
<td>Techniques of Designing Instructional Simulation Games</td>
<td>33</td>
</tr>
<tr>
<td>Evaluation of Games</td>
<td>36</td>
</tr>
<tr>
<td>Areas in Which Games Are Used</td>
<td>40</td>
</tr>
<tr>
<td>Recent Research in Home Economics</td>
<td>53</td>
</tr>
<tr>
<td><strong>3. DEVELOPMENT OF THE GAME</strong></td>
<td>64</td>
</tr>
<tr>
<td>Objectives</td>
<td>64</td>
</tr>
<tr>
<td>Generalizations</td>
<td>65</td>
</tr>
<tr>
<td>Collection of Information</td>
<td>68</td>
</tr>
<tr>
<td>Development of the Board</td>
<td>69</td>
</tr>
<tr>
<td>Writing of Questions</td>
<td>69</td>
</tr>
<tr>
<td>Statement of Game Rules</td>
<td>70</td>
</tr>
<tr>
<td>Trial of Game</td>
<td>71</td>
</tr>
<tr>
<td>Development of Tokens</td>
<td>72</td>
</tr>
<tr>
<td>Playing the Completed Game</td>
<td>74</td>
</tr>
<tr>
<td>Development and Use of Evaluation Instruments</td>
<td>75</td>
</tr>
</tbody>
</table>
The present study considers gaming. Potential uses and advantages of this teaching method span age groups from primary school to adulthood. Likewise, a broad range of subject areas include vocational, social, and scientific education.

Simulation is frequently used with gaming. According to Webster's dictionary the verb "simulate" means "to assume or have the appearance of, without the reality; to feign." The noun "simulation" has a variety of meanings. In popular usage, it is often a fancy term for an imitation, a copy of something but not the real thing. In the biological sciences, simulation is used to denote an organism's assumption of deceptive features such as color or structure to protect itself from its enemies.

Lasser (1969) used simulation to imply that one thing is like another, that it reproduces the characteristics of
Chapter 1

INTRODUCTION

Teaching for higher cognitive learnings is an area of concern in education. Methods, materials and techniques must be made available to the teacher for this purpose. Major innovations which have potential for higher cognitive learning are already on the drawing board or are in advanced stages of development. These include computer-assisted education, gaming as an instructional tool, and competency based education.

The present study considers gaming. Potential uses and advantages of this teaching method span age groups from primary school to adulthood. Likewise, a broad range of subject areas include vocational, social, and scientific education.

Simulation is frequently used with gaming. According to Webster's dictionary the verb "simulate" means "to assume or have the appearance of, without the reality; to feign." The noun "simulation" has a variety of meanings. In popular usage, it is often a fancy term for an imitation, a copy of something but not the real thing. In the biological sciences, simulation is used to denote an organism's assumption of deceptive features such as color or structure to protect itself from its enemies.

Raser (1969) used simulation to imply that one thing is much like another, that it reproduces the characteristics of
something else in certain important respects, but is otherwise somewhat different. According to Tansey (1969) a simulation is an analogue, a reproduction of reality.

The terms simulation and game have various meanings depending upon the particular use. In the field of education, Gordon (1972, p. 13) stated that a basic difference between an educational simulation and an educational game, is that

A simulation is more likely to be applied to the study of issues rather than processes. The principal purpose of a simulation is to encourage students to express, in their own words, the basic arguments for the different sides of the issue. The principal purpose of a game, on the other hand, is to get students to make more and more intelligent decisions as they learn more about the process represented. This difference may explain why the term simulation is often applied to role-play games in which negotiation and debate figure prominently.

Gordon (1972, p. 12) also reported that a mere matter of semantics occurs in the use of simulation.

On occasion, the word has been used because it sounds more serious than game. Perhaps it is felt that educators are more likely to be interested in the technique if all traces of frivolity are eliminated. Simulation is simply the more encompassing term. All games are simulations; not all simulations are games.

The basic difference is this: In a game, a winner is usually identified; a simulation need not have a winner. The distinction is minor, not universally agreed upon, and probably interesting only to professional designers.

Maidment and Bronstein (1973, p. 6) defined simulation game.

... an activity in which participants interact within an artificially produced environment which recreates some aspect of social reality. ... Specific rules are contained within the simulation game which govern the sequence and methods of interaction.
According to Abt (Boocock, and Schild, 1968, p. 78) a game can be essentially a combination of the dramatic arts and the systems sciences. Woven into the design of such games is an opportunity for students to develop analytic approaches and to organize concepts which are transferable to familiar academic and real-life problems.

Culturally deprived students are particularly responsive to gaming. They seem to be motivated by the challenge the game situation offers and find it relevant to their lives. It involves no coercion by outside authority and is a way to achieve peer approval.

Gaming encourages players to think intuitively, use analogy, and test for limiting conditions, while providing a cross-disciplinary, concrete, experimental attack on problems. In brief, gaming involves essentially all of what is often referred to as the basic principles of learning theory: active rather than passive participation, positive reinforcement, generalization to cover varied contexts, learning simple or complex knowledge with understanding, cognitive feedback, and allowance for slower and more rapid learners (Hirsch, 1967).

Statement of the Problem

This study focused on the development of a simulation game to teach certain aspects of housing. Underlying the development of the game was the assumption that a simulation game can be an effective teaching technique. The development of the game
involved the use of a simulation design; objectives and generalizations for housing, questions that required decision-making, and designing a game board.

More precise objectives were (1) to gain information about simulation gaming, particularly current research in the area of gaming in home economics, and (2) to develop a game for use in teaching specific behavioral objectives in the area of housing.

Importance of the Study

It was believed that since simulation gaming was a recognized innovation in home economics instruction, information provided by this study could be used to guide teachers in selecting, designing, and evaluating games.

Limitations of the Study

The scope of the research was limited to high school Home Economics III classes and college students. The researcher developed the game for use with her own students at Brandon-Valley High School, Brandon, South Dakota. The game was limited to certain areas of housing including art principles and elements, backgrounds, windows, lighting and wiring, furniture, furnishings and equipment, care, personal interests, and accessories.

Conceptualization of the Game

The game was conceived with the idea of making a part of the housing unit in Home Economics III different by designing
a game, a new teaching technique for the researcher, which could be used by the class.

The game was to provide interaction among the students as they assumed the roles of family members in a home which they could plan and furnish, providing a means of learning and applying knowledge about various aspects of housing. The original concept was to develop a housing project as the game was played, simulating the decisions made. The project did not materialize because of the lack of time and materials.

The interior of the simulated house on the game board was the area of concern. The major subject divisions in the curriculum were used as areas of the game.

Use and Development of Games

The use of games in education is as important as any supplementary tool. The games must be selected, designed, or redesigned to meet specific objectives for particular participants in the designated subject matter. An educator can best learn to know the game by playing it.

Literary resources were utilized in gathering data to design this study. The process of developing the game required step-by-step planning, development, trial and revision. The development utilized objectives to give direction to simulated experiences. Flexibility is an essential key to the development of any game. Concerning the difficulty of developing a game, Twelker (Zuckerman and Horn, 1970, p. 315) stated that
It has become apparent that developing operational simulation games that may be used in a wide variety of classroom settings by a wide variety of teachers is quite a laborious process. It is relatively simple to conceptualize a game, but it is rather difficult to move from a basic conceptualization to a game that is playable in a classroom and can be used by teachers other than the designer.

**Definition of Terms**

Educators and authorities in the field have not yet agreed on common definitions of terms; thus, one may encounter a number of synonyms in the literature. Terms in this thesis are used as follows:

- **Simulation**: assuming the appearance of something in the real world or carrying out a real-world process in an artificial environment.

- **Game**: a form of play involving competition and/or cooperation within a framework of rules.

- **Simulation Game**: a form of play in which real-world responsibilities are assumed and from which learning results.

- **Model**: a reproduction, abstraction, or representation of a real-world system or process.

- **Participant**: a person who is involved in playing the game and ready for those concepts and information being simulated.

- **System**: an operation which takes place in a progressive series of steps, often pictorially shown in a flow chart. The subject matter of an investigation or learning experience that is studied, a way of organizing and using resources to maximize a certain outcome.

- **System design**: a structured plan for development of procedures leading toward a goal.
Role-playing: acting the part of another person for the purpose of learning how he feels, or learning new skills.

Organization of the Thesis

The remaining chapters of this thesis include the following:
(1) a review of literature which teachers might read to familiarize themselves with important aspects of this teaching technique,
(2) the development of the game designed in this study, (3) the findings of the study, (4) a summary with recommendations for further improvement in the game design and for further research in the area of gaming for home economics classes.
Chapter 2

REVIEW OF LITERATURE

History of Gaming

There is nothing new about gaming. War games are as old as gladiators and jousting knights, who used them to develop alternative tactics and strategies. Chess was an early form of a war game. Many variations of "war chess" have been created, each one an adaptation to changing military concepts. Helwig, Master of Pages at the court of the Duke of Brunswick, developed a form of war chess in the 18th century which used a board made up of 1,666 squares, and had pieces representing battalions of fusileers, squadrons of dragoons, and batteries of siege guns (Kibbee, Craft, and Nanus).

War chess evolved, primarily, as a result of the work begun by the Prussian War Counselor von Reisswitz in 1811. He used many maneuvers on actual maps of terrain instead of a checkered board. The Germans made extensive use of war games during World War I and World War II (Tansey and Unwin).

Kibbee, Craft, and Nanus (1961, p. 6) spoke of one of the most elaborate war games now being used, "the U.S. Navy Electronic Warfare Simulation (NEWS)," installed at the Naval War College.
at Newport, Rhode Island, at a cost of approximately seven million dollars.

Games played on table tops have provided a respectable means for the study of war and maneuvering, since the mid-seventeenth century when a group of Prussian generals adapted chess for an exercise. According to Carlson (1967) it was not until 1956 that a nonmilitary strategy game was devised.

Business games had their historical roots in war games and military map exercises. For example, two opposing military teams were given hypothetical missions. They were able to select alternate decisions in an attempt to obtain the objectives. The same idea was used to involve decision making in business games. The decisions were evaluated by referees and the results returned to the participants, who then made further decisions. The first practically useful business game was developed by the American Management Association in 1957, the "Top Management Decision Simulation." Since then, a large number and a wide variety of business games and simulations have been developed.

The concept of business games has more recently evolved into games for management training purposes. Carlson (1967, p. 62) stated, "Spurred by the growing availability of computers, the American Management Association put together the first widely known management training game." The contribution of games to training and learning is important to business, particularly
because of the time dimension. Kibbee, Craft, and Nanus (1961, p. 42) stated about a management game that

... Its state is constantly changing in response to previous actions. Planning must consider the present and the future simultaneously. Emergencies must be anticipated. Crises must be met. With no other teaching technique has it been possible to demonstrate so vividly the effects of sequential decision making in a business environment.

Collegiate teaching in the field of agriculture has for years used economic models representing commodity markets and farm enterprises in a manner somewhat similar to the use of business games. Although there has been a great deal of interest among agriculturally related businesses, applications were limited.

In 1965 a survey was made of games used in agricultural economics courses at 56 colleges. On the basis of the reports, Babb and Eisgruber (1966, p. 21) stated that it "seems reasonable to assume that the use of business games will greatly increase in teaching agricultural students and managers of firms handling agricultural products."

Simulation games are also important in education. The first published work about simulation in education referred to a project known as the "Jefferson Township School District." The first intention was to examine the "on the job" behavior of elementary school principals. Background information of the school system, staff, classes, rules, policy and films were compiled. The participant then made all the decisions of the principal of that school. When the simulation game had been played, an analysis
of the responses was made. Later it became obvious that simulation games offered many advantages to education. Participants became involved to a great extent. They did not just talk about problems but solved them. They experienced feelings of an actual principal on the job. There was obvious learning by doing.

The Carnegie Institute of Technology began pioneering in games for the classroom as early as 1958. The design of simulation games for classroom use, however, is basically a phenomenon of the last decade. Social scientists were probably the first to use gaming as a technique for the classroom. Games were used with great enthusiasm but lacked the evidence to support the claims for what they would or could do in the classroom. Most researchers were intent upon designing games rather than evaluating them. The field was small, and the learners were so excited and interested in playing the game sessions that their involvement was accepted as evidence of learning.

The work that has been done seems to be divided into two broad categories: to train pupils in the acquisition of content and skill and to train people in social and moral concepts (Tansey and Unwin, 1969). Classroom games have been used to train pupils in the acquisition of content and skills. A number of simulation games were designed to train people in social and moral concepts. Leaders using games to teach social and moral concepts include Guetzkow, Alger and others at Northwestern University and Coleman and Boocock at Johns Hopkins University. Layman Allen,
a law professor; formerly at Yale, has developed a number of games to teach content of a mathematical kind and to improve logic.

The recent history of educational games and simulations seems to indicate another way of characterizing games into two distinct periods of research and development. Cherryhomes (1966, p. 4) said,

... The first phase, based mainly upon work with simulations of international relations, both all-man and man-computer, was largely impressionistic and subjective. Reports of these exercises began appearing in 1959. In the second phase, which began around 1962, a number of new kinds of simulation games were developed; games were tested in regular classroom simulation; and there were attempts to make the evaluatory research more objective and quantitative.

Schools need to consider the objectives of the game in relation to the needs of the student. Carlson (1969, p. 16) said about a colleague that

For James S. Coleman, professor of Social Relations at Johns Hopkins University, the rise of educational games involves an extensive critique of the high school in American society and the place of the adolescent in that society.

Our American society demands that schools be able to perform their educational functions so that students will learn to become successful adults able to make wise decisions in striving to reach their goals. Carlson (1969, p. 14) declared

... Indeed, it is in the schools where strategy games are most varied and where, ultimately, their use may prove most rewarding.

Many schools are finding that various problem-solving games can be helpful in teaching everything from mathematics and
business administration to international relations and home economics. Carlson (1969, p. 22) summarized the history of educational gaming as follows:

The rise of educational games, then, is a product of a complex of factors: The long rich history of war gaming, the development of computers, and quite recently, the growing appreciation by educators of a link between play and learning.

Advantages of Simulation Gaming as an Instructional Tool

There are many advantages of simulation gaming for both students and teachers in our educational system. Games offer the following for students: (1) motivation to learn, (2) relevance to daily experience, (3) incentive to apply and transfer learning, (4) natural sequence in learning, (5) a flexible approach to problem solving, (6) a setting in which intuitive power and insight are developed, (7) opportunity to develop skills in interpersonal relations, (8) economical and safe experiences, and (9) experiences of long-time processes in a short time. Through the use of simulation games the students are better able to expand fundamental relationships and concepts necessary throughout life.

Motivation to learn. The high incidence of school dropouts in disadvantaged populations and underachievement in privileged student populations indicates many cases of inadequate student motivation. Games provide pleasure in participation which, in turn, motivates learning.
Beck and Monroe (1969, p. 48) support the motivation of games because "Simulation provides a responsive environment which may give learners a sense of immediacy and involvement." Raser (1969, p. 18) agreed that "... participation in a simulation deepens the involvement of the subjects, and simulations offer an opportunity to state 'future events' so that they may be analyzed and 'played through.'"

Tansey and Unwin (1969, p. 20) reported Coleman as stating that

"... The schools in America start the process of teaching from the assumption that the pupil is already motivated to learn. ... The function of the simulation or game is to revise this model. In the ideal simulation situation the participant assimilates the information or material available to him in order that he may reach the goal set for him in the game. ... Given a goal, a student will seek information in order to achieve that goal. ..."

As reported by Carlson (1969, p. 98), McKenney also supported

the idea that the competitive aspects of a game do result in motivation to learn and help sustain effort. Brown noted that "... gaming isn't an answer by itself; a game is purely a motivational tool." In order to be meaningful, Brown added, there must be readings and follow-up activities (Carlson, 1969).

Relevance to daily experience. The content of games is inherently relevant to the daily life of participating players because they become personally involved in a realistic situation in which they are developing their decision-making abilities.
Life is full of experiences and situations which require a decision relevant to past learnings.

There is a great need for relevance in our educational system today. Tansey and Unwin (1969, p. 19) stated that:

... If the actual acquisition of knowledge were the goal for the majority, the relevance of what was learned would not be significant. But we do know that school children want to know the point of what they are learning, and recent reports on education such as the Newsom Report stress the need for relevance in the curriculum.

Simulation is realistic. Meckley (1970) said that the pressures of the "real world" are brought to bear on students through their attempts to solve various simulated problems. Abt (Berne, 1964, p. 118) commented that "Simulation games aren't designed to reproduce reality, but rather to give students realistic insights into the forces producing a situation."

Boocock (1967, p. 94) realized that

With the current games it is possible to give students some meaningful way of confronting the real versus the ideal world, using the game as a model of the former and then encouraging students to discuss whether or not they "like" this model.

Raser (1969) indicated that the situations used in gaming may be made physically more adaptable, and hence more readily observed than the true-life experience used in other educational techniques. This adaptability and ease of observation help to bring the gaming objectives to the foreground, highlighting them, and clarifying them. The simulation has functioned to simplify a system when complexity obscures the material to be learned.
Beck and Monroe (1969, p. 48) commented that the objectives of simulation experiences are relevant to everyday living.

Simulation can provide experience in a wider range of educational objectives; affective as well as cognitive; process as well as content oriented; by the instructor and elaborated concepts of cause and effect.

**Incentive to apply and transfer learning.** Application of learned information requires that the information be organized and related to other information stored in one's mind. In educational games, the initiative to organize information is motivated by interest in the game and the competitive pressures to exploit all available information for achieving immediate game objectives. The information stored is immediately needed, functionally relevant, and used to apply the solution to new problems.

Carlson (1969, p. 43) stated that according to Cohen students who are participating in a game

... become quicker and more sophisticated about abstracting, organizing and using information from a complex and diffuse environment. Also, they become better at distinguishing between valuable and trivial information, and, finally, they become more effective at coordinating information and actions between the separate functions . . .

Students in the above study found that they were able to justify their actions in a game, as well as accomplish a goal. The researchers claimed that the behavior of players was very similar to that observed in real life. For this reason, it was likely to transfer to real life. Some authorities consider it to be difficult to measure accurately what the student learned.
or what will transfer because of the intense involvement in the game, the number of participants, their age, sex and ability, as well as the variables in a given situation within the game. Tansey and Unwin (1969, p. 32), however, said that simulation "... enables complex problems to be made simpler and so to be more easily understood."

Procedures for solving these simulated problems are similar to procedures for solving problems in everyday life; therefore, the procedures are again applied as the problems occur. Beck and Monroe (1969, p. 48) related that "Simulation is a setting for rehearsing responses in a structured environment." They also said, "With simulation there may be greater transfer from the training situation to the life situation."

Natural sequence in learning. Learning occurs seemingly naturally as the game proceeds in an orderly sequence. In educational games self-directed learning usually occurs in three successive phases as a result of the active participation and intense involvement of the student. Abt (Hirsch and Colleagues, 1967, p. 131) recorded these phases as

... (1) learning the facts which the game context and dynamics present; (2) learning the processes of variable changes over time simulated by the game; and (3) learning the relative costs and benefits, risks and potential rewards, of alternative strategies of decision making.

The sequence structured in games creates a growing familiarity with the subject matter and intellectual confidence without
the student realizing that he is learning. As the game progresses the student finds himself growing in skills and knowledge in the area of the game. The student experiences the fun of playing the game. Then, natural discovery of intellectual relationships becomes the real fun and the greatest motivation for learning. Carlson (1969, p. 167) stated that his colleague Abt's view was that

... The child deeply involved in the concrete activity of educational gaming becomes aware of formal relationships by direct experimental manipulation. Pleasureable rewards for manipulating formal relations effectively are fed back immediately in the form of game success...

The student player gains a growing sense of structure among the game variables, with a correspondingly growing sense of structure of the subject simulated by the game. This can expand the student's attention span and intellectual confidence.

Flexible approach to problems. Educational games generally cultivate a flexible approach to problems because there is no single correct outcome nor is there one best strategy that will always work. Gordon (1972, p. 30) cited that

... Games investigate dynamic processes in which many variables operate at the same time, and experimentation with solutions is encouraged. This approach encourages initiative and risk taking, realism and imagination. Ultimately, it can be an antidote to the cynicism often produced by the handing down of "right answers" that are found to have little relation to the real world.

A setting in which intuitive power and insight are developed. Educational games reward rather than penalize intuitive insights into problems, because results rather than methods are stressed.
Intuition results in the identification of information significant for the solution of a given problem. Insight into a problem may be superior to routine analysis because it is faster, it may be preferred for its problem-solving efficiency, and it should, therefore, be encouraged. Abt (Hirsch and colleagues, 1967, p. 128) said, "... The games, like reality, provide operational tests of the most effective methods of solution, without prejudice to either conscious or intuitive means."

Beck and Monroe (1969, p. 49) formulated that simulation through experimentation

... can provide a field for practice in hypothesis formulation, testing and modification. Successive strategies in problem solving can be tried on an "unchanging" base situation.

The decision-making type of game does not have just one correct answer, but it teaches the learner how to apply and evaluate alternative courses of action.

Carlson (1969, p. 32) reported McKenny to declare that students learn things from business games "... as a result of reflecting on their actions and experiences and from trying to justify their decisions and the resulting economic consequences."

Carlson (1969, p. 56) continued by reporting a political game in which Alger said that "... games also offer insights into aspects of the decision-maker's predicament that are assumed to be peculiar to the institutions being simulated." Other gamesters alleged that players acquire new insight into the pressures,
uncertainties, and moral and intellectual difficulties which are involved in the real-life situations simulated.

If simulation problems are well designed, they involve both human and technical, administrative and supervisory skills. The player learns about himself as he interacts with other people during the game and as he observes their reactions as well as his own. Meckley (1970) listed the advantages of simulation as being self-revealing and giving immediate feedback. Both of these contribute to the intuition a person develops.

**Opportunity to develop skills in interpersonal relations.**

Games help students develop such skills as perception, self-expression, communication, and negotiation. Gordon (1972, p. 29) stated that

"Because most games require negotiation and compromise, verbal and interpersonal skills are developed. Arguments must be gathered and presented persuasively. Players must learn when to yield and compromise, and when to hold out for their own interests."

As players are involved in a game they find the most appropriate methods of getting what they want. This game involvement sharpens the student's perceptions of other people and develops the ability to evaluate and respond to their needs and interests, as well as his own.

Games provide students with a means of empathizing with people who are in varying roles and positions that they find unfamiliar or that they perhaps view with hostility. Games help
to broaden understanding of the viewpoints and attitudes of other people. Gordon (1972, p. 31) said that

Games can be especially beneficial to students who are ordinarily shy and withdrawn; they seem to lose inhibitions, and behave in surprisingly active and communicative ways during play. Because normal relationships are suspended and real-world threats removed, the risk of losing face is lessened, and students participate freely . . .

Educational games can add depth to the socialization process in the classroom. Gordon (1972, p. 32) also stated that

Peer relationships are also cultivated by game playing. Since games usually depend heavily on personal interactions, students learn the limits of acceptable behavior among their peers . . .

. . . Game situations emphasize interpersonal relations; they encourage self restraint and attention to the needs of other individuals and they do so in relation to serious, real-world problems . . .

Economical and safe experience. It is frequently cheaper and safer to study a given phenomenon in a model or in a simulation than in its natural setting. Beck and Monroe (1969, p. 49) said that

Simulation can provide experience in a low cost model of a high cost environment. Practice in business management is possible without the risk of bankruptcy; a pilot trainee can make a "fatal" mistake without loss of life or aircraft. This is a comparative statement. Simulation can be expensive.

Raser (1969, p. 15) stated that "Experiments performed on a model can eliminate costly mistakes that might cause waste or disaster if not caught."
Simulations allow us to avoid putting humans into situations that are dangerous, but allow us to study the dangerous situation itself without actually creating it.

Experiences of long-time processes in a short time. The keynote of the dimension of time is the balance between long- and short-term considerations. The participant in a game is able to operate in an environment of larger scope than he normally would from day to day. He learns to consider the whole performance and the interrelationships of all facets.

Simulation games can provide short-time experience and feedback for a long-time process. Results of the decisions made can be evaluated without waiting. Beck and Monroe (1969, p. 49) said "... Simulation allows practice in decision making in a timeless environment. This is of particular advantage when patterns requiring rapid decisions can be slowed down for beginners and thus studied for a longer period of time than a real life situation would allow.

Time limitations make it necessary to organize information to effectively encounter each situation. Participants in games are constantly adjusting to changes, relationships and other variables which have occurred or are anticipated within a game. It becomes obvious that present decisions can limit, guide, or dictate future decisions. Kibbee, Craft, and Nanus (1961, p. 42) said that
Participants are often placed under severe time limitations to simulate the stress encountered in a real managerial situation. With limited time for analysis and incomplete or unobtainable information, as in real life, it becomes necessary to organize effectively for decision making.

The time dimension of games permits chains of events to be reproduced so that students may observe the effects of different kinds of input variables and the possible effect upon a real-life situation. Raser (1969, p. 17) stated that simulations allow scholars to reproduce chains of events that they could not otherwise observe repeatedly.

Simulations allow the student to reproduce many times a situation that might never occur again in real life; this aspect enables him to examine certain variables and relationships with respect to their influence on the outcome of the real life situation.

Simulations allow us to observe the effects of different kinds of manipulation of the input variables; parameter values, and to modify the relationships among elements of the system.

The time involvement varies with the method of playing the game as structured by the designer. Some of the games take greater time because they allow for identical trials for one player or for a series of plays. Beck and Monroe (1969, p. 47) believed that

A player repeats a replicable situation when feedback indicates his decision consequences are dysfunctional, choosing other options for different consequences.

Replicability for subsequent players is necessary in competitive games and for evaluation of games and players. Designers find it necessary to impose strong game structure during development and validation. The rules then may be modified to allow adaptability.
Student progress through the relationship justifies the time required to play a game. Allen (Gerlack, 1967, p. 609) said that games can be justified in terms of time required to play them.

... He also pointed out that the games seem to be most profitable for the weaker students, in that frequently these students make greater progress in a given skill than do the students who were more advanced at the beginning.

Advantages for Teachers

Teachers can use games as an innovative method of reaching the desired objectives. There is great possibility for design and use as well as potential for student involvement.

Potential for reaching all types of students. Games are suitable for almost all types of students of any age or ability level. Playing educational games seems to have an especially desirable effect on certain students; for example, there are many students who were previously withdrawn, unresponsive, non-achieving, and troublemaking who have come to life in a game session and proved themselves. Boocock and Schild (1968, p. 256) said that... the unsuccessful student can learn—if you provide him with the appropriate tools. This learning, as measured in studies so far, is not a result of psychological treatment of the individual; the studies have not used games for therapeutic purposes to remove personality blocks and motivational obstacles in order to release a suppressed learning ability. They have simply placed the student, as he is, with whatever motivational psychological, cultural problems he may have, in a different learning situation—and he learns.
The ability level for which the method is appropriate is a point to consider with the masses of students that use any educational tool. Tansey and Unwin (1969, p. 61) reported

... If there is to hand a teaching method that works for the above average, the average, and the below average pupil at the same time, and if it teaches them the things that it is desired to learn, then it is a good method. Games would seem to do this, judging by a mass of literature which claims this as the case. Whether it does so for all students is unlikely, but that it does so for most students is probable.

Gaming has the potential for removing blocks to learning that are present for some students. Abt (1967) said that games offer greater opportunities for peer learning because of reduced anti-authoritarian inhibitions to learning from teachers and the reduced ambiguities across cultural and sociological barriers.

An innovate method of teaching. Games have the advantage over other techniques of sometimes being more exciting, more meaningful, more participatory, more certain to involve learners, and are less abstract, less tedious, and less threatening. All teachers are more skillful with some techniques than with others. Spitze (1972, p. 9) said that "... the effective teacher must be very knowledgeable in his subject matter and convinced of its importance to his students." The teacher has a variety of techniques at his disposal, each of which needs to be carefully selected to meet the particular objectives for the students.
It was recommended in a position paper from Instructional Simulation Inc. (1971, p. 8) that instructors develop their own learning games. Reasons given were as follows:

*** the instructor can devise those learning objectives deemed most beneficial, thereby selecting the content as needed
*** there is greater latitude in the design and use of the unit when the instructor develops content—also, greater likelihood of use.
*** non-packaged content affords the opportunity for student involvement in the development of content for their units.
*** the instructor is more familiar with the mechanics and purposes of the unit, if involved in content selection and development

Instructional Simulations Inc. (1971, p. 8) also listed the following factors in favor of pre-packaged content units of learning games:

*** it's much easier for the instructor, takes less time and the unit is self-contained
*** the unit has been 'tested' by a variety of 'educational experts,' persons who have endorsed the benefits of unit
*** the content is more general, likely more 'universal' and meets the general needs of the average classroom teacher
*** there is more 'fun' packaged and guaranteed by such a unit than by a unit requiring teacher development, also more 'certainty.'
*** many pre-packaged units are part of a larger learning package; the game is supplemental or adjunct. Hence, very little extra cost.

Limitations of Simulation Gaming as an Instructional Tool

Educational games are by no means a cure-all or panacea for the problems faced by the teacher. In fact, they may have many limitations. Major limitations are thought to be that games are
(1) difficult to design, (2) difficult to evaluate effectiveness, (3) expensive and time consuming, (4) dependent upon a favorable attitude of the teacher, and (5) vulnerable to abuses.

**Difficult to design.** The more innovative a new technique, the greater the difficulties of coordinating the situations of the real world into a teachable unit. Boocock and Schild (1968, p. 261) said that The problem is to which extent such "serious attention" is indeed forthcoming and whether it will be translated into actual large-scale adaption of the gaming-technique.

Beck and Monroe (1969) stated two limiting themes centered on the design problem of games. One is achieving fidelity to the real situation so that learning will transfer to life situations as they are met, and second, validation of the simulation program as an effective medium for learning.

**Difficult to evaluate effectiveness.** Games need to be evaluated to determine their effectiveness for the particular student objectives. What is true of one game may not be true for another game or for the same game in a different setting. The effectiveness may well be limited in the way Cohen (Carlson, 1969, p. 170) suspected . . . games may tend to "dehumanize" students by allowing them to maneuver the lives of others without at the same time subjecting players to a system of constraints similar to that which exists in the real world.
It has been difficult for researchers to develop measures to help answer some of the questions raised previously as to the effectiveness of games. Tansey and Unwin (1969, p. 33) indicated that the usual kind of evaluation of method may not be important.

... it is very difficult to obtain quantitative evaluations of the effectiveness of simulations. This may be no bad thing, as we tend to be over-concerned with measurement in education, much of it of little benefit to either teacher or child. It is felt that the method has enough advantages to commend it to many teachers in certain stages and areas of education.

Expensive and time consuming. The factors of cost and time may be both an advantage, as discussed in a previous section (see pages 21-22) and a limitation. Beck and Monroe (1969, p. 49) stated that the limiting factor of cost is found in

... (1) development of the program, including field testing and revisions; (2) the environmental requirements for installation and use of the simulation program after it is developed; and (3) training personnel for effective supervision of simulation training programs.

Kibbee, Craft, and Nanus (1961, p. 9) also noted that cost may be excessive.

... In general, they cost more, both in money and personnel, than other educational tools. They require more planning and usually more time, and where a computer is involved, scheduling may be a problem.

This (1970, p. 22) stated that an excessive amount of time may be needed.
The chief disadvantages would appear to be the amount of time that is required to properly conduct or set up the simulation, and the fact that all the variables and information cannot be included or total realism captured.

Dependent upon a favorable attitude of the teacher. The use of educational games alters the role of the teacher. Games tend to bypass the teacher's mediation between student and material, therefore allowing players to interact directly with materials or one another. It is for this reason that many games and their ultimate success are affected by the feelings of the teacher. Abt (Boocock and Schild, 1968, p. 82) included attitude of the teacher on his list of the principal limitations of the effectiveness of educational games.

... Some teachers feel that games are not "serious," or that students will not take them sufficiently seriously, thus possible dissipating student concentration.

A possibly more permanent problem is the attitude some teachers have toward complexity in games. The students are quite accustomed to plunging into situations of which their understanding is uncertain or incomplete. The teachers, on the other hand, often feel constrained to understand the rules completely...

A few teachers distrust educational games because they doubt their intellectual validity, or historical verisimilitude... This objection is based on a misunderstanding of game objectives.

A more serious limitation of educational games is their very attractiveness to students. It must be recognized that educational games are not a substitute for, but only an enhancing complement of, conventional study methods.
Vulnerable to abuse. Games are vulnerable to abuses, sometimes being used for purposes never intended by their designers. Carlson (1969) reported that there is that "influence unit" that is a questionable abstraction. The relationship of the realism of the game to the dimension of time is especially important. Players may complain about being pushed and rushed into a decision without time to think. Students may also let their behavior become stereotyped. Some students perceive the game in a peculiar time setting that may be unrealistic.

Educational limitations have been summarized by several writers. Among these are Chaplin (1968, p. 803), who wrote as follows:

The problems have been numerous: the lack of a theoretical framework; the influence of the teacher or director in setting the tone; the question of whether or not outsiders should evaluate the effectiveness of the simulation game and their possible influence upon the activity; the particular environment and the type of students who engage in the games; the difficulty getting accurate and valid instruments for measuring both short-term and long-term attitude change; the consideration of the Hawthorne effect; and the immense problem of generalization about simulation games in general from one particular game. All of these factors have produced conflicting data, and in light of the difficulties in doing research in this field it is understandable.

Instructional Simulations, Inc. (1971, p. 8) published a position paper in which the following unfavorable factors of games designed by the teacher were summarized:

*** the amount of time required to select and develop a set of content [sic] for a learning game takes time away from other educator tasks
the number of educators who feel qualified to engage in materials development is few; most teachers would settle for pre-packaged content as a method, learning games devoid of content tend to represent "blank pages", rather than "ready-to-use" materials.

Unfavorable factors were also listed for learning games of pre-packaged content.

the pre-packaged unit lacks flexibility and diversity; it may serve one learning objective, but it is unlikely to serve a series of learning objectives.

most pre-packaged content units do not permit modification, much less the introduction of new content for special learning problems.

pre-packaged content should serve as "examplar" materials, not necessarily as "the" content to be learned.

"you get exactly what you pay for--no more."

In cost/benefit terms, pre-packaged content adds to the cost of the unit.

Types of Games

Educational games fall into two basic patterns: board games and role-play games. The format selected depends upon the subject of the game, the purpose, and population for which it is designed.

Board games. Many classroom games resemble commercial entertainment games in that they are built around a gameboard on which most of the action takes place. This type of game is used when the game is intended to graphically represent the process under study. Board games are usually planned for a small number of players.
Role-playing games. Role-playing is understood by some to mean the depiction of character in scenes for illustrative purposes. For example, an instructor may stage a setting in a course on careers for practicing the proper approach to use when interviewing for a job. Twelker (Zuckerman and Horn, 1970, p. 313) suggested another interpretation:

... For others role-playing means the same thing as sociodrama, which originally referred to a therapeutic technique involving groups, in contrast to psychodrama, which is a therapeutic technique for individuals. Still others equate role-playing with "let's pretend" as "play-acting."

The last meaning suggested by Twelker in the above quotation is assumed in most simulation games. For example, when a student behaves as though he were the clerk in a clothing store, he is "being someone else."

Role-playing is aimed at providing the adolescent with practice in dealing with the make-up of the adult world. The student is allowed to play a role in a large differentiated society of which he otherwise gets hardly a glimpse. The environment is artificial for the present, but realistic for the future.

The nature of roles varies from game to game. In some, there is little differentiation among roles; for example, all students might play the role of a consumer. In other games different students play different roles. For students who do not perform well in conventional classroom activities, Gordon (1972, p. 109) suggested that they "... be given a chance to play outstanding roles, if they are interested. In a class that uses
games regularly, this practice can be altered if it is not successful." This practice would give a feeling of success and prestige to students who have little opportunity in the traditional classroom to experience success.

If the role-playing game is cast by the teacher, there needs to be careful examination of all roles to determine which student would profit most from playing the various roles. Most role-play games are designed for an entire class of approximately thirty players. Many game instructions indicate which roles could be omitted if the class were smaller and additional roles to include if the class were larger (Gordon, 1972).

Hybrid games. Many games are a combination of the board and the role-playing type. The basic action is played on a board but there is also some negotiation that takes place among players. In role-playing games the action that takes place may be recorded on a board, thus combining both patterns of educational games. Game boards may also be used to formulate and observe an overall play until a consensus or conclusion is reached at the end of a play or complete game.

Techniques of Designing Instructional Simulation Games

Game designs are as varied as the people who design them. People experienced in the field have, however, suggested steps which might be followed when developing a game. The approach used
to design an instructional simulation game is important to the results obtained by the players as they participate in the game interaction.

Gordon's ten steps. There seems to be little similarity between Gordon, Brodbelt, and Twelker, each of whom has developed steps to assist in the development of a game. The key factors expressed in Gordon (1972, pp. 125-33) are the goals or objectives, the players, and the rules.

<table>
<thead>
<tr>
<th>Game Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1. Define design objectives.</td>
</tr>
<tr>
<td>Scope</td>
</tr>
<tr>
<td>Step 2. Determine the scope of the game in terms of the issues to be examined, its setting in time, and its geographic area.</td>
</tr>
<tr>
<td>Key Factors</td>
</tr>
<tr>
<td>Step 3. Identify key factors in the process, whether individual, groups, organizations, or institutions.</td>
</tr>
<tr>
<td>Player Goals</td>
</tr>
<tr>
<td>Step 4. Define the objectives of the actors, in terms of wealth, power, influence, and other rewards.</td>
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<tr>
<td>Player Resources</td>
</tr>
<tr>
<td>Step 5. Determine the actors' resources, including the game information each receives.</td>
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<tr>
<td>Decision Rules</td>
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<tr>
<td>Step 6. Determine the decision rules, or criteria that actors use in deciding what actions to take.</td>
</tr>
<tr>
<td>Player Interaction</td>
</tr>
<tr>
<td>Step 7. Determine the interaction sequence among the actors.</td>
</tr>
<tr>
<td>Constraints</td>
</tr>
<tr>
<td>Step 8. Identify external constraints on the actions of the actors.</td>
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<tr>
<td>Scoring</td>
</tr>
<tr>
<td>Step 9. Decide the scoring rules or win criteria of the game.</td>
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<tr>
<td>Presentation and Rules</td>
</tr>
<tr>
<td>Step 10. Choose form of presentation and formulate sequence of operations.</td>
</tr>
</tbody>
</table>
The Foreign Policy Association's six guidelines. Goals are the key factor which Brodbelt (1969, p. 177) identified for participants using a model with guidelines which govern behavior.

First, one must identify some goals to be achieved. Second, construct a simplified model of the game. Third, identify the roles of individuals and groups who will be participants. Fourth, set the conditions for the players, being certain to set up specific guidelines regarding voting procedures, resources, personnel, et cetera. Fifth, develop specific objectives or goals for the actors. Sixth, set the limits and overall rules that will govern permissible behavior. Include time limits.

Twelker's thirteen steps. Twelker (1969, pp. 68-70) followed the empirical process of developing a game design using a field test, modification, and further trial before dissemination.

Step 1. Define instructional problem
Step 2. Describe the operational educational system
Step 3. Relate the operational system to the problem
Step 4. Specify objectives in behavioral terms
Step 5. Generate criterion measures
Step 6. Determine appropriateness of simulation
Step 7. Determine type of simulation required
Step 8. Develop specifications for simulation experience
Step 9. Develop simulation system prototype
Step 10. Tryout simulation system prototype
Step 11. Modify the simulation system prototype
Step 12. Conduct field trial
Step 13. Make further modifications to the system deemed appropriate from field trial evidence

Some of the most significant problems and issues can be studied through use of simulation, but it must be tried to be appreciated. Most students agree that simulation provides an alternate approach to the techniques of teaching. The particular
design approach used and the purpose for the game simulated depend on the specific objectives of the builder and user of the simulation.

Evaluation of Games

Games which teachers use need to be evaluated to determine the effectiveness of the technique for the classroom. Research from the Center's Academic Games program specifies five specific questions to ask when considering the effectiveness of games (Hollifield, 1971, p. 9):


Teachers cannot just assume that the game is good because a large sum of money is paid for it. The game must be evaluated before and after its use to determine its value and effectiveness for the classroom. A very complete set of questions was formulated by Spitze (1970, p. 20) for use in judging games as teaching techniques.

1. Is the time required to play the game reasonable in terms of expected learnings?
2. Is the game itself subordinate to the learnings; i.e., not "gimmicky"?
3. Does the game create interest, excitement enjoyment of learning?
4. Is the structure of the subject matter carefully preserved in the game; i.e., no misinformation implied or wrong implications drawn because of omissions, oversimplification, etc.?
5. Is it complicated enough to be interesting and challenging, but simple enough for the rules to be understood quickly?
(6) Is it flexible enough to be adapted for students of different ability levels and for different purposes?
(7) Does winning the game require knowledge rather than luck?
(8) Is the "paraphernalia" for playing the game reasonable in cost, storage requirements, etc.?
(9) Does the competition remain friendly? Team competition may be better than individual so that cooperation is also involved.
(10) Does the game require high levels of cognitive behavior? Foster good relationships among students? Aid in skill development? Improve attitudes toward learning? Help clarify values?

Gaming effectiveness is an area in which little research has been done; however, some of the specific points mentioned previously have been helpful in game development and evaluation.

Criteria for use in the evaluation process have been presented by several authorities. Tansey and Unwin (1969, p. 36) stated probably the simplest and most concise set of characteristics to consider when selecting a game: "(1) the degree of competition, (ii) the degree of structure, (iii) the degree of participation."

Authorities place emphasis on the factors they consider important to the criteria of the game. The learning objective provides the basis for the choice or creation of the game which enhances learning. The more abstract class activities are given more variety and spice. The structure of the knowledge or skill to be taught must be carefully maintained so as to avoid misinformation or wrong emphases. Competition on a low keel and cooperation is encouraged especially by the use of teams (___, Illinois Teacher, 1969).
The simulation or game may have rigidly defined limits or it may be constructed rather loosely. Abt Associates were quoted in Tansey (1969, p. 37) as recommending evaluation of a game on the basis of

1. Validity. How truly representative of the real life situation is the model?
2. Coverage. How much of what is important in the real life situation is present in the model?
3. Comprehensibility. How easy is the model to understand and conversely how easily are the significant processes which have been modeled understood from the model?
4. Experimental Utility. How useful is the model in permitting the experimental manipulation of the real life processes in order that they may be investigated in changing conditions and under differing circumstances?
5. Applicability. Is the model significant in so far as it assists in the understanding and possibly in the control of the real life conditions that are depicted by it?

Rapoport (1970, p. 53) stated that the following criteria must be specified in the statement of the game rules:

1. Set of players.
2. Set of alternatives open to each player when it is his turn to make a choice among such alternatives.
3. A specification of how much a player can know (when it is his move) about the choices already made by the players on previous moves.
4. A termination rule indicating situations which mean that the game is over.
5. A set of payoffs (one to each player) associated with every outcome of the game, the outcome being the situation in which the game has terminated.

Meier (1961, p. 159) described an effective game as follows:

1. The scorekeeping should be simple, so that at best a handful of different kinds of acts successfully completed are submerged into a total.
2. The amount of refereeing, umpiring, and judging required to keep the game going should be minimal for "non-official" or intramural contests.

3. The basic strategies should be simple enough so that unskilled spectators may be able to follow the action and play the role of partisans.

4. Anybody should be able to play at the "sandlot" level with trivial expenditures for equipment and facilities.

5. The random element in the game (what the players refer to as luck) should be reducible to a large degree by the acquisition of skill.

6. The primary skill created by the achievement of excellence in the game should be correlated with professional or occupational competence, while the secondary skills should be relevant to a broad spectrum of adult social roles or should be useful in later stages of education.

For years educators have talked of providing innovative teaching in the classroom. Spitze has devised many of her own educational games. Spitze (1972, p. 7) provided a list of teaching principles which are applicable to gaming techniques used with learners of all ages and abilities.

1. If the learning situation is a part of "real life" or seems real to the student, he will perceive the relevance and be more eager to learn.

2. If the learner is an active participant, his interest is likely to be greater and achievement more rapid.

3. If the learner is mentally and emotionally involved in the learning situation, motivation and learning are increased.

4. If the student is involved in choosing the techniques to be used, he will more readily accept the resulting situation.

5. If the chosen techniques help the student to experience success, his self-esteem and motivation will be enhanced.

6. If the student finds pleasure in the learning situation, he is more likely to continue learning.

7. If the student develops skills for independent learning, he can continue to learn when no teacher is available to direct him.
(8) If the student sees usefulness in his learning activities, motivation will be increased.
(9) If the student develops positive attitudes toward learning, he will be more likely to continue learning independently.
(10) If the learner discovers an intellectual relationship, he has greater joy in learning and greater interest in continued learning than when he is told the relationship.

Areas in Which Games Are Used

Simulation games have many varied uses, both in the world today and in the world of the future. Gordon (1972, p. 13) stated that "war, business, research, planning, training and education are activities that utilize the technique to an increasing degree."

Business and management training. Management problems are increasing in complexity every day. The nature and the environment within which the problems have to be analyzed are changing at an increasing rate. Common to all companies facing these problems is the objective to train participants to think about broad business problems, and to play ahead for technological and institutional change. Babb and Eisgruber (1966) said that business games have proven to be useful in attaining this type of objective. The emphasis in business games is on giving students or management personnel an opportunity to apply the knowledge gained. Babb and Eisgruber (1966, p. 26) continued,

Basic concepts of management such as planning and control, organization, and coordination, have a deceptively simple appearance, but are of a complex nature and difficult to teach by traditional methods. There is no approach (short of actual experience)
which can enforce the interrelationships of the above mentioned concepts more clearly than business games.

Business management games were originally developed as teaching devices for use in both pre-service and in-service training sessions. Later, however, they were employed in situations other than educational. Kibbee, Craft and Nanus (1961, p. 145) made the following statement regarding the expanded uses of management or business games.

Management games have been used primarily as an educational tool... In addition, management games will undoubtedly have considerable application in research, problem solving, and personnel testing. There are also exciting potentials in regard to their use as a direct aid to management decision making.

The above authors proceeded to relate uses of business and management games as

... ice breakers, and for general orientation, but also for serious information purposes. One company wanted to acquaint its Board with a variety of special details and facts. Instead of verbal presentation, with the usual charts and other visual aids, the Board actually took over the management in the form of a management game, and ran the company for a few simulated years. In this way details on costs, sales, personnel, etc., were more readily assimilated as a result of the involvement in the game situation.

According to Carlson (1969) about 200 companies use games to supplement pamphlets, lectures and case studies. The game may simulate the problems of running a company, department or industry. The wide variety of uses can be seen by a few examples of business games. At Proctor & Gamble Company, employees spend six hours several times a year playing Venture, a company game. The game
puts company employees in the shoes of a simulated management team running a firm that makes cake mix or detergent using the total decision-making process.

In Fame, a game used by International Business Machines Corporation, a computer is used to analyze problems and alternatives before deciding what to do. It is played by IBM managers as well as executives to learn what a computer is and how management techniques can be applied to their companies.

At Boeing Company about 1,000 employees in line for management jobs play Operation Feedback, a game that simulates difficulties they may face as managers. Operation Suburbia was designed to show middle management men the importance of planning on a long-range basis, organizing their work and cooperating with others. Top executives play Operation Interlock, which highlights their particular problems in the company.

Many business games simply try to stretch executives' imaginations and improve their abilities to get along with people. The Sun Oil Company added realism and pleasure to the game "Flounders Waffle Iron Corp., Flip Your Waffles with Flounders---You Will Smell the Difference." Industrial Relations Counselors, Inc. has put together a game for hospitals designed to help administrators get better cooperation from staff by acquainting them with problems and priorities of other departments in the hospital.
Business games used by the above companies, as well as games used in a large number of companies not mentioned, vary in many ways. Some games are general and do not identify products, markets, or industries; others are very specific. Some games involve all aspects of a business while others are restricted to one phase such as production, marketing or inventory control. In most business games, the competitive environment is largely determined by the game participants. Most games are of a sequential nature; that is, decisions in one period affect results not only in the current period, but also in succeeding ones. Some games are subject to a chance element. For example, sales may be a function of price, advertising and the like, plus random variation. The number of participants on a team normally increases with the complexity of the game. In some games, players are assigned to definite roles as production or sales managers. Games vary in whether they are processed manually or on computers.

**Education.** The use of simulation games is an approach to learning that is fundamentally different from the methods traditionally used in most of our educational systems. Adams (1973, p. 9) stated that "The key difference is the emphasis on experiencing as opposed to simply being taught."

Students learn by playing simulation games. Livingston and Stoll (1973, p. 8) stated some educational objectives that simulation games achieve.
Simulation games can increase the student's knowledge of terms and concepts, of specific facts, and of structures and relationships. They can help the student develop certain intellectual and social skills. And they can change the student's attitudes toward the things which are simulated in the game.

The emergence of games in the classroom can be understood in terms of new developments in education and curriculum changes in many areas of education. One such development is that teaching should be concept oriented. Advocates of games as teaching aids claim that knowledge of terms and concepts can best be grasped through various problem-solving exercises, using games to develop concepts and generalizations.

Thiagarajan (1973) wrote about some games termed "Naked Monsters" which were developed to instruct teacher trainees in the skills of teaching concepts. The game descriptions indicate that players not only attain the stated objectives, but also discover principles of concept teaching. The sense of play becomes a motivating device in the classroom for the conceptual learning process. Gearon (1968, p. 274) stated that "The student is intrigued and feels a sense of discovery as he formulates new ideas and concepts."

Techniques that are exciting, meaningful, and which involve the learners and prepare them with concepts with which to face the world are providing an effective means of teaching. Spitze (1972, p. 12) stated that games are desirable teaching techniques because
(1) the students are active participants, (2) the students are mentally and emotionally involved, and (3) the situations are real or reasonable simulation of reality.

Further, when using a game setting for the discovery of intellectual relationships, the students find it to be a pleasant experience in a non-threatening atmosphere. They make decisions and develop skills for independent learning. Simulation games represent the structures and relationships of real life. Players observe the actions that take place and learn the cause-and-effect relationships that operate in the real situation.

The inquiry approach used in some games places its emphasis on teaching the student to ask the right questions, rather than requiring him to remember information. One way to study the relationships in any kind of system is to try to predict the effects of changes. A knowledge of specific facts may be required in some situations to play the relationships, to predict changes, and to use necessary information to achieve the gaming objectives.

An old adage states that experience is really the best teacher. If this is true, how can education provide experiences appropriate to the students? The answer may well be to use games that simulate real-life situations. The real-life situation is not always possible; therefore, a simulation game which encourages students to be active participants is substituted for it.

Gordon (1972, p. 27) stated that educational games can be profitable because they stimulate learning beyond the recall level.
Our goals extend beyond conveying information, but our methods lag behind. Educational games can be profitably used in any subject area; but they promise to be most important in the social sciences, to provide laboratory experiences that are otherwise difficult to create.

A simulation game can teach intellectual and social skills at the higher levels of learning by providing the incentive to achieve. The opportunity to develop and practice the skills affects the players, facilitating the transfer of learning to real-life situations.

A simulation game can also change a player's attitude toward real-life situations by providing information and experience in playing different roles, thus helping players to view differing available positions. A player has the experience of making his own decision.

Many of the advantages of gaming as an educational tool seem rooted in the fact that humans like to explore, experiment, compete, and interact (Hirsch, 1969). Interaction occurs in a game as the participants act their roles and as they relate the subject matter and learning tasks to the rules and overall learning objective.

Abt (1970, p. 13) stated that games are effective teaching and training devices because

... they are highly motivating, and because they communicate very efficiently the concepts and facts of many subjects. They create dramatic representations of the real problem being studied. The players assume realistic roles, face problems, formulate strategies, make decisions, and get fast feedback on the consequences of their action.
Students learn from games because of several factors associated with gaming, one of which is relevance. When studying the relevance of games for high school students, Lee (1972, p. 167) stated that "simulation games put participants in situations that imitate reality, assign them roles to improvise, then require them to analyze what they have done." Students who seem hopeless scholastically can handle some very complex simulation games because they see the relevance to their daily lives. Learning is essentially a process of guided self-discovery, and participation is obviously an important factor.

Another factor promoting learning is that games can make learning enjoyable. In games which are well chosen, the fun is a by-product. Games have an element of surprise and competition which makes them exciting; they provide the challenge of confronting difficult or confusing or even risky situations. Games also may be adapted to other subject areas and made simpler or more difficult for differing abilities. According to Kachaturoff (1971, p. 543)

... an important objective in using the technique of simulation is to give the learner various experiences to observe, to describe, to conceptualize, and to evaluate the diverse patterns of human interaction involved in implementing formulated policies.

Educators use games in a variety of ways and to achieve differing types of objectives. Spitze (1972, p. 7) advised teachers who were preparing to use games

... to try different techniques, to use variety, to create new ones, to find out which ones are most suited to the particular style of teaching, and
which ones are best for subject matter and for the students.

In education, games are most frequently used by teachers as a part of regular classroom instruction. Games are also a valuable resource for students to use during free time, home room, and other unassigned periods of the day. Time which is otherwise used on frivolous things can be devoted to learning with the use of games. Games provide a way to use time profitably rather than wasting it. Games are used by administrators, such as school superintendents and principals, for the planning of curricula, assignment of teaching staff, and allocation of facilities and equipment.

Many of the older games were designed for junior and senior high school courses. There are now simulation games for elementary grades, college, and graduate school courses as well as adult education.

Games help the teacher obtain variety in teaching at all age levels. Zieler (1969, p. 2) stated some of the possible ways to use games:

1. Some games can be used to introduce a new topic or unit.
2. The game is also useful as the principal activity during the progress of a topic or unit.
3. The game may be a culminating activity finalizing the learning preceding it in the study of the unit.
4. The game may represent a review activity or repetition preceding an examination.
5. Finally, the game may be used for remediation purposes.
Some games are to be played by just one child and others by an entire class. Others still are excellent for small groups.

The educational use of games may require the instructor to play a different role, the role of a resource person, designer, developer and evaluator. Abt (1970, p. 30) reported that the role of a teacher becomes "... more of a research director and coach than a lecturer and disciplinarian." The game enables the teacher to individualize and direct instruction for students progressing at different rates.

Schools may provide resource people equipped and capable of helping the teachers put games into practice without overburdening the instructor. The method of approach to gaming by the teachers and resource people is extremely important. Adams (1973, p. 103) suggested an approach for using games as an instructional technique.

... In using such a new approach as simulation games in education it is best to do careful work on a classroom-by-classroom basis, rather than having the general staff adopt it wholesale. Having individual teachers and their students decide if, when, and how they will deal with simulation gaming would seem to be the best approach for really positive use of this innovation.

The use of games as an instructional technique not only changes the role of the instructor but also the atmosphere of the classroom. Sprague (Carlson, 1969, p. 108) claimed,
drop their usual facades, thus opening up better communications between themselves and you. And maybe simulations—like any new technique—will cause you to look at your usual teaching methods with a more critical eye.

Teachers may use simulation games to revive student interest in the learning process. One method is to give students the task of designing a simulation game and then using it. They may construct their own or re-design an existing game. Another method of maintaining student interest by involvement is to have students attempt to validate the theory found within a simulation by a variety of comparisons with the real-life situations. The students could re-design a simulation on the basis of their validation efforts.

Implementation of the game needs careful consideration. Cherryholmes (1966, p. 7) foresaw a number of problems when game strategies were translated into specific classroom assignments.

. . . Constructing a good simulation is not easy. If high school students and undergraduates try to build models of political and social processes, techniques must be developed to facilitate their task. The subject matter of the course must be arranged to present basic facts and features of the referent system so that students can design a model, operate, validate or revise it. Such exercises will require considerable amounts of class time.

There are wide differences of opinion concerning the amount of research on gaming which is acceptable as evidence for its success, some authorities going so far as to say that the amount is very slight. Kibbee, Craft, and Nanus (1961, p. 9)
are among those who say that there is very little scientific research that validates the effectiveness of games as teaching techniques.

Some questions have been raised as to the validity of games as a training tool, just as questions have been raised about other educational devices. Very little scientific research has thus far been done on validity.

These authorities continue to support gaming on grounds other than research.

Game builders and game users themselves, perhaps somewhat embarrassed by their own enthusiasm, are often overly subdued when speaking about the value of games. Admittedly, there is certainly a need for objectivity, and even caution. But games are not a fad; they are a serious educational technique.

Several reasons are given by those who have found little research in which games are evaluated. According to Boocock and Schild (1968, p. 8),

One reason is the lack of adequate work in educational experimentation generally, which as Bruner puts it, "has been conducted and is being conducted in the dark—without feedback in useable form."

Another is the relative newness of the simulation gaming technique as applied to the classroom. Most researchers in the field have been concentrating upon designing the game themselves, with evaluation at best a secondary activity. Finally, the enthusiasm and involvement of most participants in most game sessions are so impressive to the observer that they have often been accepted as evidence of learning in the absence of "harder" data.

A common procedure for evaluating a teaching technique is the use of an experimental design. Boocock and Schild (1968) discussed the ideal evaluation of a game as being a comparative
study which had a control group. There are problems when attempting
to design field experiments in which several teaching techniques
are compared. Boocock and Schild (1968, p. 20) stated the following
difficulties:

Just setting up comparable experimental and control
groups is more difficult in practice than in theory . . .
Controlling the behavior of the persons adminis-
tering the game is another problem . . .
A final problem in comparison studies concerns the
nature of the activity in the control groups . . . The
difficulty is compounded in that educational research
in the past has indicated that even minor changes within
a set of teaching materials can change its results.

Tansey (1969, p. 7) also questioned the need for comparing
gaming with other classroom techniques.

It does not matter that the technique of simulation
is measured against another method and found better or
worse, for what teacher is there who has not felt, and
felt often, the need for an alternative way of present-
ing information to a group of students who have failed
to learn by other methods.

Some field experiments involving gaming as teaching
techniques have been conducted. Boocock and Schild (1968, p. 105)
stated that

Both Baker and Wing report on use of games over
a longer time period, and compare their effects to
learning by conventional methods.

These researchers imply that, in general, gaming was superior to
methods with which it was compared.

It is clear that the superiority of a specific
simulation over conventional teaching does not
imply that all games are more effective; similarly,
negative findings in respect to specific games do
not discredit the method as a whole.
The effects of using games within the high school classroom were studied at the John's Hopkins Center. According to Hollifield (1971, p. 1) the results were positive and conclusive.

Research has revealed that simulation games positively affect the learning of students. 

Although some research in the area has been done, the usual basis for enthusiastic use of games in the classroom is the philosophical and psychological soundness of the technique. The success of any single educational technique depends on its relevance to the subject matter and the illustrated principles, its motivational and emotional impact, the environment for testing and evaluating, the degree to which it relates training with the situation, and its suitability for the particular participants in the program.

The issue of the learning value of games is more complicated than just asserting that games teach. An adequate understanding of each game is necessary to evaluate whether it teaches particular concepts better than another method of teaching.

It may be concluded that simulation games are effective supplementary tools, but not substitutes for traditional methods. Even the ways in which they can be used are still experimental.

Recent Research in Home Economics

Lattes-Casseres (1968) compared two approaches to teaching managerial decision-making processes to high school students. The purpose of the study was to determine whether simulation games would
be as effective or better than more traditional methods for teaching home management decision-making concepts.

The study used a quasi-experimental design involving random assignment of two different treatments to eighteen senior high school home economics classes in schools used as student teaching centers by Michigan State University. The experimental treatment combined lectures, discussions and the playing of a simulation game, Life Career, as the major learning experiences. The control treatment consisted of more traditional teaching approaches, especially discussions, lectures, case studies, readings and writings. For experimental classes a "packaged" unit of five lessons including objectives, content and learning experiences was prepared by the researcher. The five lessons for the control classes were based upon the same objectives and content, but the control teachers devised and organized their own learning experiences.

Teachers in all cases were home economics student-teachers from Michigan State University who had a common background of knowledge in home management and no teaching experience. Students were tested before and after the experimental treatments. The tests and questionnaires were designed to obtain learning data from students at three cognitive levels and on selected affective elements related to learning. In addition to questionnaire data, teachers reported the organization, teaching methods employed and
student participating for each lesson plus student background data from school records.

Eight hypotheses were formulated. Three of them predicted that students in experimental classes would learn more than those in control classes about home management decision-making at three cognitive levels: knowledge, comprehension and application. Five hypotheses in the affective area predicted that students in experimental sections would show greater interest in and enjoyment of the decision-making unit than students in control classes, that they would perceive it as being more relevant to their lives, and that their interest in home economics and home management as well as their ability to empathize with other decision-makers would increase significantly.

The resulting F values from statistical analysis were all non-significant, leading to the rejection of all eight hypotheses. It was concluded that there was no difference between experimental and control students in cognitive learning of home management decision-making facts, concepts and principles, nor in attainment of effective objectives.

Recommendations were that (1) the Life Career game be simplified and the number of rules reduced in order to make it understandable, and thus probably more enjoyable and meaningful to high school students; (2) more time be allowed for a unit employing simulation games than just the five lessons used in this study; (3) the teacher participating in such a project be
thoroughly knowledgeable of the game; (4) more than one teacher be used for handling large classes while game sessions were proceeding; (5) the teachers express positive attitudes toward the game; (6) more time be devoted to discussion of the outcomes of the game so that students will profit from their play sessions.

Lattes-Casseres concluded that cognitive learnings in home management can be taught by the experimental method as effectively as the control methods. A trend appeared for greater effectiveness of the experimental method with the older students at the higher cognitive level, application, while the control methods were more effective with the younger students at the lowest cognitive level, knowledge. Findings in the affective area indicated that students in experimental classes were more negative in their interest and enjoyment of the unit. Although many expressed dislike of the game, other students found it to be "very realistic," "fun," "enjoyable," and "different" from the usual classroom routines. Finally, the researcher concluded that games should not be an overemphasized method, but an aid to effective teaching when used in conjunction with other techniques, within the framework of the home management curriculum.

Harbin (1970) developed simulation games, had students design games and selected suitable commercial games for use in home and family living classes. A study was designed to determine, through the use of experimental and control groups, whether the use of the games as a method of teaching would help to change
students' attitudes toward dating, mate selection, and marital role expectations.

Harbin used two experimental and two control groups. Experimental group A was made up of five randomly selected students from the Home and Family Living Class who assisted in designing games. Experimental group B contained the remaining eleven students in the Home and Family class who did not assist in designing games. Control group A were fifteen girls enrolled in a Homemaking III class. A home room class of fourteen comprised control group B. Students in both experimental and control groups were juniors and seniors in Muleshoe High School, Muleshoe, Texas.

Concepts to be taught and behavioral objectives for students in the Home and Family Living class were formulated. Permission was obtained to revise the Olson, Gravett Premarital Attitude Scale (hereafter referred to as the PMAS) and the background questionnaire, which accompanied the instrument. Simulation games designed by the author, students, and commercial companies were used during the study. The decision was made to use the PMAS as a pre-test and a post-test and to use the difference between the two as the measure of attitude change.

The students were able to (1) synthesize factors that help establish wholesome attitudes toward marriage, (2) identify problems in marriage and be able to make mature decision in solving them, (3) identify purposes of the engagement period, (4) identify and understand patterns in the family life cycle,
(5) find available resources for marriage and family counseling and understand the significance of using them, and (6) identify roles of mother and father in rearing children.

Increased enthusiasm and motivation were observed in the experimental group in which games were developed. There was, however, no significant difference between the groups in attitude. The author concluded that students were motivated by playing the games and that teacher and student developed games are worthwhile only if a teacher is willing to spend a great deal of time in developing learning techniques and administering the games. The teacher's role is altered during gaming and classroom discipline is not the same as in a traditional class. One who uses games must be observant and determine when students are tired of the gaming method.

The following recommendations were made: (1) other studies should be undertaken to determine the usefulness of simulation games, (2) definite steps should be taken to test the content validity of the PMAS, (3) items should be clarified if the scale is to be used with high school students, (4) items should be reworded, deleted, and some items added to the PMAS, (5) samples should be larger and more carefully selected in future use, (6) a scoring device should be formulated which would indicate directions of attitude change, (7) "game banks" should be built for use and exchange by teachers interested in this method of
teaching, and (8) students in summer homemaking should develop games, as it is time consuming during the regular term.

Fox (1970) did a pilot study of a housing selection simulation game. The initial game was an evaluation device designed by a group of four students in a home economics education course at Iowa State University. The purposes of the study were (1) to develop the evaluation device into a game used as an instructional tool, (2) to evaluate the extent to which the game was useful in teaching specific behavioral objectives, and (3) to analyze the usefulness of the simulation game as a teaching technique. Fox supported the purpose of her study by stating that the game technique is useful when objectives include decision-making, problem analysis and solving, long-range planning, relational thinking, and understanding of structure and processes in the cognitive domain. Changed attitude, opinion, and values and the development of empathy for others are some affective objectives that may be achieved through simulation games. Games do not single out one factor to be examined and discussed but consider many factors simultaneously in a dynamic on-going situation, providing a logical framework for the analysis of complex processes and for the organization of information.

A segment of a unit in housing selection, of which the game was the central learning experience, was developed. Cognitive and affective behavioral objectives, generalizations and supplementary learning materials were supplied, along with the statement of the
purposes of the simulation and the anticipated learnings. One hundred forty-four (45 boys, 99 girls) eleventh and twelfth grade students enrolled in family living, advanced homemaking, and housing courses in six Iowa schools participated in the study. Findings were presented through a description of the teachers, the pupils and school situations; teachers' and players' evaluations of the game; and an analysis of the post-game test. The teachers evaluated the game according to its ability to motivate students, its intellectual content, operability of game mechanics, relevance to specific behavioral objectives, and its general effectiveness as an educational tool.

Fox found that nearly all teachers gave affirmative responses to statements concerning the game's motivational effectiveness, with the exception of mixed reaction to class interest at the start of the game. The intellectual content of the game was considered useful and appropriate. It was considered to be appropriate content for post-high school and adult groups but not for tenth grade students. Responses and comments indicated that rules and scoring procedures needed clarification and that the game was considered relevant to the stated objectives.

A majority of the players enjoyed participating in the game and would like to participate again, playing a different role. Over 80 percent of the students believed their awareness of problems related to housing was increased through game
participation. Recommendations were made for further refinement of the game design, for improving game administration, and for further research.

Froke (1970) developed a simulation game for use in senior high school home economics classes teaching the concept of table setting. The game was evaluated using the mean and standard deviations of the pre-test and post-test, and the correlation between the scores on the pre- and post-tests. The significance of the differences between means was computed.

The sample consisted of four beginning home economics classes in Robbinsdale, Minnesota. Each class included sophomores, juniors, and seniors, from 17 to 22 members per class. The students were given a pre-test on table setting. After the test they were given an introduction to the game which they would be playing one week later in their two-hour laboratory class. An instruction sheet which included the information needed to play the game and a study sheet on table setting was given to each student. They were encouraged to practice. Before playing the game the directions were reviewed and the class was divided into teams of equal numbers. When the game was over, the class responded to a post-test and gave their reactions to the game on a questionaire.

Froke found that in each of the four classes the mean of the post-test was greater than the mean of the pre-test. Post-test standard deviations were higher than the pre-test standard.
deviations. The students were enthusiastic about playing the game and indicated an interest in playing games in future units.

Recommendations for further study included the following:

1. Simulation games could be developed for any of the many other areas in home economics and tested for their effectiveness in the classroom.
2. A similar study could be conducted to determine the effectiveness of simulation games at different I.Q. levels.
3. A study could be conducted using a control group and an experimental group to determine if the students learned more from the instruction sheet or from playing the game.
4. A study could be completed which involved a larger population from which a random sample is drawn and which equates the two groups.

Clements (1970) study was on the development of the Family Finance game, a simulation for teaching a unit on the use of consumer credit. Purposes were to find out teachers' opinions about using games, to determine the students' attitudes about using the game as a learning experience, and to assess the effectiveness of the simulation game as compared with other teaching methods traditionally used.

The game was evaluated considering operability, motivational effectiveness, intellectual content and relevance. The Family Finance game is a simulation of financial decisions which might confront a young married couple. The study was limited to eleventh and twelfth grade students in sixteen schools. Before beginning to play the game, students read the profiles of couples, reviewed
their financial statements, and familiarized themselves with the forms used and the goods available for purchase. The goal in playing the game was to maximize the net worth and maintain a good credit rating by using cash and credit with care.

As a result of this unit, it was hoped that the students would form the following generalizations: (1) The use of credit involves definite responsibilities and obligations. (2) The use of credit increases the cost of the product. (3) The ease of obtaining credit encourages spending which may not always be advisable. (4) The acquisition of goods and services may be limited in the future (including emergencies) if credit is overextended. (5) Credit is a valuable tool for individuals who are able to control it and use it cautiously. There were four areas in which teachers encountered problems: (1) motivation of students, (2) teaching methods, (3) resources and materials, and (4) concepts to be included.

There were four recommendations for further investigation into the development and testing of simulation games: (1) testing the value of simulation games for reaching students with a variety of ability levels, (2) developing and evaluating simulation games for other areas of homemaking education, (3) developing an instrument to measure whether or not playing the Family Finance game develops competencies for using credit, and (4) changing the format of the Family Finance game, color coding the game, and reviewing arithmetic and game forms.
Chapter 3

DEVELOPMENT OF THE GAME

The purposes of this study were (1) to gain information about simulation gaming, particularly current research in the area of home economics and (2) to develop a game for use in teaching specific behavioral objectives in the area of housing.

This chapter presents the following aspects of the procedures used in the design and development of the game: statement of objectives, formulation of generalizations, collection of information, development of the board, writing of questions, statement of game rules, trial of the game, development of tokens, playing of the game, and development and use of evaluation instruments.

Objectives

The objectives, both cognitive and affective, were stated for use in teaching certain aspects of housing. After participating in the game the students would be better able to

(1) evaluate interior house plans for adequacy, convenience, and livability
(2) evaluate interior background treatments in terms of suitability, original cost and care
(3) develop criteria for the selection of appliances in terms of cost, durability, care and special features as they relate to the needs of the family
(4) develop criteria for the selection of furnishings in terms of cost, durability, care and design as they relate to the needs and interests of the individual and the family.

(5) develop criteria for the selection of accessories in terms of design, cost, and care as they relate to the needs, interests and creativity of the individual and the family.

(6) improve techniques used in the care and repair of the home to create safe and efficient operation.

(7) analyze the role of family interaction involving relationships and responsibilities within the family.

(South Dakota Home Economics Curriculum Guide, 1968)

After the objectives were selected, the content area of housing was grouped into nine basic divisions. These divisions included the following: art principles and elements, background, windows, lighting and wiring, furniture, furnishings and equipment, care, personal interests, and accessories. These divisions all consisted of problems and situations in which decisions must be made so that families may obtain the satisfaction which they desire in a home. The concept of decision-making is basic to the process of using what one has to get as much as possible of what one wants. Good decision-making contributes to attainment of goals of individuals and the family.

Generalizations

Generalizations were selected for all of the nine housing area divisions. They were listed as follows:

(1) A home which is functional for individuals and the family provides for everyone's needs.
(2) Analyzing housing needs results in greater satisfaction to the family.

(3) Interests, goals, needs and preferences of family members should be considered when decorating the home.

(4) Housing needs are based on the number, age, activities, and values of family members.

(5) Satisfaction is gained by making the best use of what one has.

(6) A functional floor plan conserves the expenditure of time, motion and energy.

(7) A house can be attractively furnished at a minimum cost with a plan for additions and improvements.

(8) Materials within a home which are selected for wearability, cleanability, sound absorption, and pleasantness to touch and sight make the home more livable.

(9) Self-expression in housing is the ability to use art principles and elements to express personality, attitudes and values.

(10) Awareness of principles of design and color will enable one to create beauty in the home.

(11) The attractiveness of an area depends on the shape and placement of objects, colors, designs and textures all coordinated together.

(12) Artistic use of accessories contributes to the beauty of the home.
Factors which influence the choice of backgrounds are cost, durability, present furnishings, use of room, effect upon adjacent rooms, atmosphere desired, and personalities of people in the home.

Wise selection, location and treatment of windows result in conservation of eyesight, electricity, heat, and time spent in cleaning.

Decisions to buy, make or remodel window treatments depend upon one's interest and available human and material resources.

Adequate lighting provides the quality and quantity of light needed for each family activity, is safe and adds to the beauty and comfort of the home.

Adequacy of home wiring affects the number and kind of appliances that can be used at one time and the performance of heating appliances, motor-driven appliances, and lighting.

Recognition of characteristics of well-designed furniture is an aid to selecting furniture which will give lasting satisfaction.

Successful decisions in furniture selection depend upon design, appearance, construction, appropriateness, quality, function, cost, care, and personal preference.

Location of furniture is influenced by use, relationship to the structural design of the house, the traffic patterns, sources of light, and relationship to other pieces of furniture.
Wise selection of household equipment depends upon its appropriateness for the purposes, the skill and frequency with which it is used, the efficiency of its operation and the utilization of its special features.

The proper use and care of furnishings and equipment reduces maintenance and repair costs.

Application of care and repair techniques for the home interior and exterior can increase safety, protect investment and add to family satisfaction.

When safety is emphasized in the selection, placement, installation, and use of household furnishings and equipment, the possibility of physical injury to occupants and damage to property is reduced.

Shared planning and responsibility for care of surroundings can strengthen family unity.

Collection of Information

The idea of simulation gaming was completely new to the researcher; therefore, after much reading and assimilation of information, the parts and pieces of a game for housing began to evolve along with many changes as the ideas were expressed, written down, and tried.

The graphic portrayal which was the first most helpful sequence for designing the game was "Steps in the Design of an Instructional Simulation System" by Twelker (1970, p. 66).
Development of the Board

The simulation game was to be designed around a board which could have as many as eight players. The reason for eight players was that the Home Economics III class in Brandon-Valley High School, Brandon, South Dakota had twenty-four students and, therefore, could be divided equally into three groups. The board game was to be scored manually. The action during the game was to involve individual play, as well as group play. Non-interaction features considered important were the questionnaire and the answering of the game questions.

The simulation of a house was achieved by having the students design a floor plan in the middle of the board. There were seven rooms including living room, dining room, kitchen, master bedroom, bathroom, second and third bedrooms.

The exterior edges of the tag board for the game were divided into sections for the placement of individual markers as players proceed to move around the board. Each section was identified with a colored subject matter area or other direction for play. The extra space in the center of the board was used to hold the questions. See Appendix B.

Writing of Questions

Questions provided the method by which the cognitive levels of learning could be attained. The use of questions also provided a means for obtaining points and securing participation of students as they proceeded around the game board.
Textbooks and pamphlets in the area of housing were used as a basis for formulating questions for each of the nine subject divisions. Point values of one, two, three or four were assigned to each question. After the questions were written, each one was assigned a number according to difficulty from one, for the easiest questions, to four, for the most difficult. Equal numbers of questions having one point, two points, three points, or four points were written. There were seven questions at each point value for each of the nine subject divisions because of the seven rooms within the house. However, to speed the game movement, questions answered did not necessarily relate to the particular room for which a player was responsible on the game board. The key for the questions was included for the interior decorator, who served as guide for the game.

The questions were revised, rewritten and improved several times. Mrs. Yost, Associate Professor in Textiles, Clothing, and Interior Design at South Dakota State University evaluated the questions for the game in Housing. The questions were typed on cards and keyed with a number indicating the subject division, the room, and the point value. The cards were stacked according to subject division on the playing board. See Appendix B.

**Statement of Game Rules**

Stating concise, easily understood rules for the game required several revisions. The rules were first stated orally, then written in rough form, then duplicated with additional details.
Before a trial in the classroom, the directions were analyzed step by step and numbered in the most logical sequence. See Appendix B.

**Trial of the Game**

The first explanation of the game was to other graduate students with whom the researcher was attending class. They were interested in the progress of the game in housing. The graduate students offered concrete helpful suggestions as well as asking questions that stimulated further exploration of ways the students could be more active participants, motivated to learn, and less involved in learning complicated game mechanics.

The second occasion for the trial of the game was an afternoon spent with senior girls in HEd 412, "Preparation for Student Teaching in Home Economics." They played the game and answered a questionnaire. The session was taped to get all of their comments, suggestions and verbal reactions, as well as the answers they gave to the questions.

A third session was an evening graduate class studying the topic of simulation gaming. Students went through the rules and mechanics of the game, helping to spot trouble areas which still were not clear. Because of limited time only two rounds of the game were played as a basis for evaluation of the board and potential for achieving the objectives.

A fourth trial of the game was with the Home Economics III class at Hamlin High School, Hayti, South Dakota. The class
of six played with a single board, offering the researcher an advantage of viewing total interaction of just one group for one 55 minute class period. The last seven minutes of the period were spent in evaluation and answering the questionnaire, while some girls remained in the classroom for a longer period of time to fill in the forms. The girls were in the housing unit but had no specific preparation for playing the game. The researcher noted particularly the number of times each player moved, the average distance moved, the points scored, the tokens received, the group interaction, the subject divisions involved in playing the game, and the answers to questions.

Development of Tokens

The major concerns as the game was developing were how to keep it moving at a pace which would hold the interest of players and how to finish or end the game. The tokens were last to take shape and add meaning to the game. Originally the intent was to develop a chart to guide player decision-making. The chart would use pictures to visualize several levels of quality and price of the same item. The player would select the most appropriate item for his particular objective, thus using the decision-making process. The time and work involved in development of these charts did not permit the researcher to carry out this plan.

The use of pictures, such as would be found in a catalogue with a wide variety of items, was considered. The player could make a selection from the pictures for use in the home. Pictures
were collected; but the variations in size, the bias that might be introduced by the variations in the available selection of pictures, and the limited number of pictures available for the subject areas of art principles and elements and care posed problems. The following questions were raised: Would the players grasp a meaningful connection between the game and the pictures? How would the player's selection be evaluated to determine the wisdom of his decision? How would the player record his choice of pictures? How could the pictures be preserved for subsequent games? How can a comparative selection always be provided? Would the mechanics of selecting a picture from an assortment detract from the learning and become time consuming?

Next the use of play money was considered. The thought was to allow the family a lump sum of money which the players in the family could budget and distribute. Then each family member would have a sum of money available to purchase items for his room. This was quickly ruled out because of the time-consuming decisions and transactions involved. It was also felt that the learning and involvement from the questions would be hampered. The zeal to earn money would sidetrack them from the questions.

The final decision was to use tokens colored and coded to correspond to the subject area divisions rather than use pictures of furniture, equipment and furnishings. The name of an object or item was written on each token. The player selected a token to fit the room he was responsible for when a question was answered.
correctly. Some tokens were left blank so that a player could write in the name of an unusual or seldom-used object that was desired for the room.

Each token was worth five points. The tokens provided the basis for ending the game. The decision was made that the game would be ended when a player had correctly answered a question from each subject area. This would be indicated by possession of a token from each subject area. The first player achieving a token from each of the nine subject divisions would receive bonus points.

Playing the Completed Game

The housing game was played in the Home Economics III class at Brandon-Valley High School, Brandon, South Dakota. Eight days were spent in preparatory study in the housing unit, at which time the importance of close concentration on the generalizations related to housing was emphasized. A study sheet listing page numbers and subject divisions where generalizations could be found in the housing text was given to each student. There were twenty-one participants: five seniors and sixteen juniors. The girls divided themselves into three equal groups.

Two procedures were tried as the groups played the game. Two of the three groups had the questions, sorted by subject matter, in stacks on the board. The player drew a question from the top of the appropriate stack. The third group had four questions per card, one at each of the four levels, but all questions on the same subject and for the same room.
The time spent playing the game varied for each of the groups because of the differences in procedures used. Two groups played the game through twice within a five day period, the class meeting for fifty-five minutes each day. The third group played the game through completely only once.

Development and Use of Evaluation Instruments

Score sheets were used to record the points obtained by correctly answering the questions. Two different score sheets were developed on which to record the points. One was devised for each player to record his own points in an appropriate square. The other score sheet was devised for use by the interior decorator or another player appointed by the group as score keeper.

The evaluation form was developed to appraise such aspects of the game as directions, questions, scores, rooms of the house, game board, and game speed. Each of the above aspects of the game could then be evaluated separately and suggested improvements made in the game. After playing the game each student was asked to express his ideas and suggestions by filling out the form. Possible responses to questions were categorized for ease in summarizing reactions. See Appendix C. The students who played the game at Brandon-Valley also wrote a personal reaction sheet expressing the feelings they had about the game.
Chapter 4

FINDINGS

In this chapter, the information obtained from the questionnaire, evaluation form, and reaction sheets will be discussed. Emphasis in this thesis was on the development of the game. The intent was not to thoroughly evaluate its effectiveness as a teaching technique.

The formative evaluation used as a part of the developmental process consisted largely of statements of reaction made by players during the trial of the game. This was a relatively unstructured type of evaluation. It did, however, provide the feedback necessary to suggest places where directions were unclear, aspects of the game which were less popular, and suggestions for improving the game.

The questionnaire, completed before playing the game, consisted of six questions used to stimulate thinking about individual and family involvements within the home. The questionnaire helped the player to identify (1) his interests and hobbies as well as those of other members of the family, (2) the desired choices students have for household furnishings in various rooms of the house, (3) the experience students have had making decisions about selection of items in housing, and (4) where students would
locate sources of help when needing information about aspects of interior housing. See Appendix B.

The results of the questionnaire from all who played the game were as follows:

(1) The most common hobbies and activities of the students within the home and yard were sewing, baking, cooking, listening to music, lying in the sun, watching television, reading, fixing hair, gardening and doing yard work, painting, writing, sleeping, and studying.

(2) The pastimes and activities students were involved in outside of the home were bicycling; horseback riding; swimming; bowling; picnicking; and participating in church activities, pep club, Future Homemakers of America, and sports. A large number of students mentioned softball, baseball, basketball, and badminton.

(3) Students expressed their brothers' interests as including cars and motorcycles; hunting and fishing; basketball, football, track, baseball, and bowling; care of horses; farming and other types of work; collecting tapes; solving puzzles; camping, going places, and dating.

(4) Sisters in the families had interests including sewing, music, sports, bicycling, horseback riding, cooking, pets, painting, reading, drawing, playing with the neighbor girls, and goofing around.
Parents' leisure activities tended to be more limited. They spent time working in the yard, camping, listening to and playing music, watching television, bowling, going to church, and refinishing furniture. Fathers spent time fishing, building things, and repairing household items. Mothers sewed, baked, cooked, and read.

As a result of the game session with the students in HEd 412, "Preparing for Student Teaching," it was decided that students definitely needed some background study in the area of housing prior to playing the game. These college students considered the game to be a good method for reviewing learnings in the housing area. They recommended rewording some of the questions.

The six students in Home Economics III at Hamlin High School who played and evaluated the game caused the researcher to make the following conclusions: Rolling a pair of dice caused the movement around the board to be too rapid because the players did not stop on each of the nine subject divisions. Therefore, it was decided that to meet the game objectives a single die should be used to permit shorter moves. The idea that tokens were to be selected to fit the room for which the player was responsible may not have been clearly understood. Some students selected a "night stand" and "bedspread" for the living room and a "pillow" and "commode" for the kitchen.

The students in Home Economics III at Brandon Valley High School were the last group to play the game. They were the only
players who were asked to record their free and unstructured reactions to the game. The reactions revealed a number of helpful suggestions. "There should be a time limit on questions." "The game probably could have been a little more fun if all players would have gotten more involved." "Maybe it would have been better if we would have known the answers." "The questions on personal feelings were about the best." The researcher noted that personal interest questions tended to stimulate more lively discussion. "The game should not be repeated without a break for some other classroom activity." "Some of the questions could be reworded for clearer understanding." "The idea of selecting tokens for the room was good."

The reaction sheets revealed some negative feelings which were expressed in the following manner: "Some of the people took a long time in answering questions and this made it boring." "It got kind of monotonous, but answering the questions and setting a time limit helped; then it was more competitive." "It wasn't the funniest game I've played." "It took too long." "I didn't think it was fun, but it did teach me." "There were other things I would rather have been doing, but I got to know some of the other girls better."

The positive comments from players outweighed the negative ones. Positive comments from the reaction sheet were stated in the following manner: "I thought it was fun." "I like it." "I thought it was quite educational." "It made you think." "It was
fun for a change and made you want to learn because if you did, then you'd be able to score for it." "I liked it because it made me learn more about housing." "It was well-organized." "It was a change of pace from the usual stuff." "I understood housing better from the game, and what to look for when buying." "It was interesting, different and fun." "I think our group learned from the game."

An evaluation form was developed to record student feedback which might be helpful in continuous revision of the game and in appraising attitude toward the game. Student responses were tabulated as indications of the attitudes expressed toward the game. The players tended to express more positive than negative responses as is shown in these results:

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<th>Positive with Reservation</th>
<th>Negative</th>
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</table>

The evaluation form also gave opportunity for players to react to directions, questions, points, game board, and other aspects related to playing the housing game. Each of these aspects of the game was judged on the basis of the player's expressed opinions. See Appendix C.
Summary of the evaluation forms of all students who played the housing game caused the researcher to identify the following good points about the game and suggestions for improvements:

1) The directions for the game were clear. One player who read the directions aloud commented that directions were probably clearer to her than to students listening to them. This suggests the possibility of a set of directions for each player.

2) Colors relatively close to each other in value and hue were easily distinguished most of the time. The gold and brown colors were the most easily confused. Colors used were limited to those available in the 3M plastic tape.

3) The questions were clear to only half of the players. Others thought that some of the questions should be restated to clarify their meaning.
(4) The game moved too slowly.

(5) The questions on the cards would be used most efficiently if players were instructed to draw one individual question card from the top of the pile.

(6) One third of the players felt that they could identify as a person in the house formed on the game board.

(7) Students who played the game for five days tended to lose interest after the second day.

(8) Students liked the game, liked study of the housing area, and were interested in hearing how others answered the questions.

(9) The majority said that questions with different point values should continue to be used.

(10) The majority wanted to record their own scores.

(11) The squares on the board should not be given point values. It was preferred that questions with different degrees of difficulty have the designated points.

(12) The use of pictures on the tokens representing the subject matter areas did not receive sufficient response to validate their use. This suggests that the tokens with word descriptions were adequate.

(13) The group playing the game should arrange the rooms on the board rather than using a board on which they had been permanently drawn.

(14) There should be a time limit on answering the questions.
The purpose of this chapter is to summarize the study and to state recommendations for further development and use of the game, as well as for further research.

Summary of the Study

The primary purposes of the study were to obtain information helpful to the designing of a game for use as a teaching technique in home economics and to develop a game in the subject area of housing.

Simultaneously with the review of literature on simulation gaming, a housing game was developed. A segment of a housing unit related to the interior of the house formed the background. Objectives and generalizations were used as a basis for formulating questions to accompany the game.

A total of fifty-five students played the game: twenty-eight college students in HEd 412, "Preparing for Student Teaching," at South Dakota State University, Brookings, South Dakota; six students in Home Economics III at Hamlin High School, Hayti, South Dakota; and twenty-one junior and senior students in Home Economics III at Brandon-Valley High School, Brandon, South Dakota.
The students were given a questionnaire on which to identify their personal interests and hobbies, to analyze the activities of other members of the family, to list the personal desires students have for household furnishings in each room of the house, to identify the experience students have had making decisions about selection of household furnishings, and to identify where they would obtain information for wise decision making related to housing. The questionnaire was used as an introduction to the game in which they were involved.

Prior to playing the game in the Brandon-Valley high school, a study sheet was given to each student to accompany the text, noting subject divisions about which generalization in housing were formulated and preparing him for playing the game.

The class was divided into three teams. After playing the game, the students wrote their assessment of the feelings they had about the game.

The players evaluated the game. It was not the intent of the researcher to evaluate the effectiveness of the game as a teaching technique. The formative evaluation from the students with their comments and suggestions was for the purpose of revising the game. The questionnaire and an evaluation form completed by the players indicated student attitudes and opinions toward the mechanics of playing the game. A majority of the players enjoyed participating in the game, but they also felt that the game speed was slow.
Conclusions

In the opinion of the researcher the simulation game developed in this study was an effective instructional technique for teaching students in the area of housing. Variations in the game may be developed in the future which incorporate more decision-making with built-in feedback concerning the results of these decisions. Thus the game is a foundation for future work in this area.

Recommendations

The following suggestions were made for further development of the game used in this study.

1. Questions need clarification.
2. Additional types of player involvement which require decision-making would contribute to the achievement of game objectives. This might involve new uses of the tokens.
3. Narrow the scope of the game by development of a smaller game for each of the nine subject divisions.
4. Field testing of the revised game is suggested as a means of validation.
5. Develop an instrument to measure the learning resultant from playing the Housing Game.

This study of the development of a simulation game for classroom use in Home Economics generated ideas that are a challenge to further research in this area. Some suggested recommendations for related research are:
(1) development of additional games for use in home economics.

(2) statement of concise directions for development of simulation type games for use by teachers.

(3) further comparison of games with other teaching techniques.

(4) further evaluation of games available commercially for use in the instruction of home economics.

(5) development of a project for an organized game dissemination.
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Gerlack, V. S. *Academic Games and Simulations in Instruction.* *Audio Visual Instruction,* 1967, 12 (6), 609.


Steps in the Design of an Instructional Simulation System

Determining What to Teach

1. Define Instruction Problem
2. Describe the Operational Educational System
3. Relate Operational System to Instructional Problem

Appendix A

Objectives

5. Generate Criterion Measures

Determining How Best It Might Be Taught

6. Determine Appropriateness of Simulation

7. Determine Type of Simulation Required

8. Develop Specifications for Simulation Experience

9. Develop Simulation System Prototype

10. Try-Out Simulation System Prototype

11. Modify Simulation System Prototype

Validating the System

12. Conduct Field Trial

13. Make Further Modifications
STEPS IN THE DESIGN OF AN INSTRUCTIONAL SIMULATION SYSTEM

DETERMINING WHAT TO TEACH

1. Define instruction problem
2. Describe the operational educational system
3. Relate operational system to instructional problem
4. Specify behavioral objectives
5. Generate criterion measures

DETERMINING HOW BEST IT MIGHT BE TAUGHT

6. Determine appropriateness of simulation
7. Determine type of simulation required
8. Develop specifications for simulation experience

VALIDATING THE SYSTEM

9. Develop simulation system prototype
10. Try-out simulation system prototype
11. Modify simulation system prototype
12. Conduct field trial
13. Make further modifications
QUESTIONNAIRE

Name ____________________________

1. What are your hobbies, activities, and pastimes?

2. What are the things you particularly enjoy doing at home other than those mentioned above?

3. What are the interests and hobbies of the following?
   a. brothers
   b. sisters
   c. parents

4. What are the things which you desire to have in each of the following rooms?
   a. living room -
   b. dining room -
   c. kitchen -
   d. master bedroom -
   e. bathroom -
   f. girls bedroom -
   g. boys bedroom -

5. Underline the items in question number 4 above, which you have already had experience selecting or buying.

6. What sources do you have available to aid you in wise selection of furnishings in housing?
QUESTIONNAIRE

Name______________________________

1. What are your hobbies, activities, and pastimes?

2. What are the things you particularly enjoy doing at home other than those mentioned above?

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   g. boys bedroom -

5. Underline the items in question number 4 above, which you have already had experience selecting or buying.

6. What sources do you have available to aid you in wise selection of furnishings in housing?
DIRECTIONS FOR THE HOUSING SIMULATION GAME

Note: 3 to 8 persons may play this game, one of whom is assigned to be the interior decorator.

Preparation for play

1. Fill in the questionnaire.
2. Place the playing board in the center of the table.
3. Arrange tokens in the appropriate depressions in the tray.
4. Arrange the seven basic rooms of this house in any way you choose within the walls provided on the playing board. (The bathroom may overlap other rooms. The halls are formed using the black strips of paper.)
5. Describe the four (4) family members who will live in this house. Specify ages, work, income, personalities, interests, and other characteristics to help make this family real.
6. Place the nine (9) stacks of questions on the appropriate place on the board.
7. Place the "move ahead" and the "go back" cards on the appropriate squares on opposite sides of the playing board.
8. Each player selects a room for which he is to be responsible. (If there are less than eight players, use only one bedroom.)
9. Place a marker for each player on "start." The marker corresponds to the room in the house for which the player is responsible.
10. Pass out a score sheet to each player.
11. Each player rolls the die, the highest scorer begins. (The game proceeds clockwise, to the left.)

Procedure for playing the game

1. Roll the die. Move the marker to the appropriate square.
   a. Stops on the board and question cards are color coded.
   b. Each color is associated with a subject area and number as follows:
      1. Art Principles and Elements - pink
      2. Background - brown
      3. Windows - aqua
      4. Lighting and Wiring - yellow
      5. Furniture and Arrangements - green
6. Furnishings and Equipment - gold
7. Care - gray
8. Personal Interests - red
9. Accessories - blue

C. Each question card has a three digit number.
1. The first number is the subject area as listed previously in the rules.
2. The middle number is the room in the house.
   - living room 1
   - dining room 2
   - kitchen 3
   - master bedroom 4
   - bathroom 5
   - second bedroom 6
   - third bedroom 7
3. The last number on the right refers to the points, 1, 2, 3, or 4, which may be received for a correctly answered question.
   The easiest questions end in the number 1 and the most difficult ones in 4.
   For an incorrect answer the player receives 0 points.
   Example: 732 means the subject is care, the room is the kitchen, and the question is worth 2 points.

2. If, for example, the number rolled on the die is four, move the marker four spaces to the brown square.

3. Since you stopped on brown, take a question from the top of the brown stack. Each question card on that stack has a three digit number beginning with 2, the number associated with brown, and all of the questions are about backgrounds of rooms.

4. Read the question aloud, think about it for no more than thirty (30) seconds, then answer it, then return the card to the bottom of the appropriate stack.
   If a player fails to respond to the question within a minute the interior decorator calls time and the player loses his turn.

5. The interior decorator evaluates the answer, using the criteria on answer cards, and decides whether the answer is correct or incorrect. If the answer is correct the player receives the number of points indicated by the last digit on the question card.

6. Record the points on the score sheet.
   a. Select the rectangle corresponding to the color of the space on which you stopped.
   b. Select the row corresponding with the room number, which is the middle number on the question card.
   c. Put an X in the square where the room number and number of points intersect.
7. If the question was answered correctly, select a token which corresponds to the color and subject matter division. Place the token in your room.

8. Use the same procedure for playing the game when stopping on a square of any other color, except black.

9. If you land on a corner square or other black space, follow the specific directions on the board.
   a. A "free" square requires no action.
   b. The "move ahead" square means the player draws a card from the top of the pile, moves ahead the designated number of spaces, return the card to the bottom of the pile, and draw the proper question card and proceed according to game rules.
   c. The "take a token" permits the player to select a token from the tray for placement within the room.
   d. The "trade a token" square means the player may offer a token to another player in exchange for one of his. The player must be satisfied with the agreement. If no player is willing to trade, a trade is not possible.
   e. The "go back" square means the player draws a card from the top of the pile, moves back the designated number of spaces, return the card to the bottom of the pile, and draw the proper question card and proceed according to game rules.
   f. To "give up a token" the player must select one token from his room and return it to the interior decorator tray.

Ending the game

1. The game ends when a player has a token representing each of the nine subject areas.

2. The first player successfully completing a room with a token from each of the nine subject areas receives 20 bonus points.

3. Tokens are worth five (5) points each.

4. Follow this procedure to compute a grand total score.
   a. Each X on the score sheet represents a number from 0 to 4. Add these numbers and record the sum in the space following "question points."
   b. Count the tokens, multiply by five, and record your bonus points.
   c. If you were the player to end the game, record your bonus points.
   d. Sum these numbers to secure a grand total.

5. Of course, the winner of the game is the player with the highest score.
SAMPLE GAME QUESTIONS

Note: The three digits refer to subject division, room number, and point value respectively.

121 What are the basic elements of design?

142 When there is a feeling of rest and contentment what principle of design has been applied?

153 How does the surface texture affect light absorption, and what is the resulting effect on the color?

154 Name two color schemes and give an example of how each could be used.

211 What is the difference between a carpet and a rug?

212 What principles of design are applied when choosing effective background treatments?

223 What are the advantages and disadvantages of wallpaper as a wall treatment?

214 Name four criteria which should be used when selecting floor coverings.

311 What is the purpose of windows?

322 What is the difference between a cornice and a valance?

353 How and why is glass insulated?

314 Name four determinants that establish the cost of custom-made drapes.

441 What does the UL symbol on a lamp mean?
422 What is the difference between fluorescent and incandescent light?

463 What are three electrical hazards in the home that need to be checked?

454 Name four types of lighting.

561 What is the worn path resulting from movement within a room called?

552 Name two examples of space-saving furniture with hidden functions.

523 What is the difference between solid and veneered wood?

514 Name four characteristics of good-quality upholstered furniture.

621 Where may information be acquired to help make a wise purchase?

652 How may service calls be reduced?

643 How can furnishings meet special needs of a family in which there is a physically handicapped person?

664 What is meant by an efficient working triangle?

711 What tasks could be dovetailed to save time when cleaning?

722 What characteristics in wallpaper would make cleaning easier?

733 How may noise and odors be partially eliminated in a house?

754 How can energy be conserved when doing the weekly house-cleaning?

831 What personal interests and hobbies are centered in the kitchen?
822 What furnishing project could you work at as a family that would strengthen family solidarity?

863 Where and how may sports equipment be stored?

854 Suggest examples of restoration projects that might be done at home.

911 How do accessories express one's values?

912 Name three basic principles in flower arranging.

953 Where, in general, should large pictures be hung? Small pictures?

974 What natural objects could be assembled to make an interesting accessory?
## APPENDIX C

### WINDOW

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**Points**

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**Points**

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**Points**

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**Points**

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- 2
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**Points**

- 1
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**Question Points**

- Token Points
- Bonus Points

**Grand Total**
### Score Sheet for the Housing Game

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#### Accessories

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**Grand Total**
Evaluation Sheet for the Housing Game

Answer the following questions.

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<th></th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>1. Are directions clear?</td>
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<tr>
<td>2. Are colors easily distinguished?</td>
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<td>3. Are questions clearly understood</td>
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<td>4. Does the game speed suit you?</td>
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<td>5. Should the questions be on individual cards?</td>
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<td>6. Can you identify as a person in the house formed on the board?</td>
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<td>7. Does the game hold your interest?</td>
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<td>8. Should each person record his own score?</td>
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<td>9. Should all questions be the same point value?</td>
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<td>10. Should the squares on the board be given a point value?</td>
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<td>11. Should the tokens obtained be in the form of pictures?</td>
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<td>12. Should the rooms be drawn on the board permanently?</td>
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<td>13. Should there be a time limit on answering questions?</td>
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<tr>
<td>14. Other suggestions for the game, questions, directions, etc.</td>
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