

THE DEVELOPMENT OF A LIBRARY SKILLS GAME FOR CHILDREN
AGED ELEVEN AND TWELVE YEARS TO AID IN REINFORCING
INFORMATION-RETRIEVAL SKILLS AND IMPROVE THEIR
ATTITUDES TOWARD THE USE OF LIBRARIES FOR
DATA RETRIEVAL

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ABSTRACT

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BY

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The hypothesis that attitudes toward information-retrieval tasks could be improved by means of a data-retrieval game was tested in an elementary school library. A pretest-posttest design was employed. Seventy-two pupils aged eleven and twelve participated in the exercise. It was further hypothesized that participation in the specially developed enquiry game would improve performance on information-retrieval tasks.

Results of a validated Paper and Pencil Attitude Test showed clearly that experimental group pupils improved "attitudes" as measured by this test, whereas attitude evaluation interviews were inconclusive.

On a Performance Test no significant difference was found in scores or number of items selected by experimental and control groups; however, the experimental group pupils showed superiority in precision of choice and use of card catalogues.

The demonstrated improvement in attitudes and proficiency with respect to resource centre usage substantiates this enquiry game's value as an educational tool.

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CHAPTER I

INTRODUCTION

1.1 The Relation Between the Resource Centre
Oriented Learning Project and this Thesis

The Resource Centre Oriented Learning Project (RCOLP) directed by Dr. Gary Boyd is an investigation of the lack of skills in children's use of resource centres for information retrieval. One conclusion stemming from earlier work on the project is that an attitude component is important in influencing student performance, and this is not solely a function of skills. This attitude component is most probably part of a general attitude toward learning, school, subject matter, teachers, and anything concerned with education. According to Dr. Boyd (1971), and in his estimation, attitude, not knowledge, is the greater problem in education.¹ In an article by Peterman and Holsclaw (1971, p. 46) they write: "Student[s] ... dislike libraries [and] are afraid of them..."² This statement is later corroborated by other writers.

¹ Gary M. Boyd, Resources Centre Oriented Learning Project, Report 1, to the Ministry of Education of Quebec, January 1971 (Montreal, 1971).

² Edward Peterman and Jim Holsclaw, "Library Orientation in a New Mode at Azusa Pacific College," Audiovisual Instruction, Vol. XIV (February 1971), p. 46.

Evidence of the attitude component in information retrieval and resource centre use appeared in the RCOLP project in the following course of events. Teachers at Crestview Elementary School in Chomedey, Quebec, selected students who they considered were doing poorly in library project assignments as subjects for the study. When under videotaping conditions, these same students showed remarkable improvement in locating relevant material for their projects. The improved results can be attributed to increased motivation and interest on the part of the pupils. Similarly, in the Azuza College experiment (Peterman and Holsclaw, 1971) the use of an audio-tutorial method of library orientation produced results indicating attitude change and better performance by the participants.³

1.2 Previous Studies

Studies have been carried out for over fifty years on libraries; studies to improve service, better collections, improvement of personnel training, implementing new methods for making information available to more people, and the like. Now work is being done on "information-seeking" habits or behavior of users.

Efforts have been made to improve library orientation techniques and instruction in library use, and the literature abounds with articles and studies in this area. Allan Mirwis (1971) has published a bibliography listing materials available

³ Peterman and Holsclaw, pp. 46-47.

between 1960 and 1970 in the form of periodical articles, research studies and theses, general handbooks and guides, and programmed texts, mostly for the benefit of college and university students.⁴ Shirley Hopkinson's (1966) bibliography of materials is geared more for use with elementary and high school students and includes films, filmstrips, books, pamphlets, and other aids for teaching library skills.⁵

Many articles are available dealing with new techniques for the instruction in the use of the library and for library orientation, and include the use of audiovisual methods (Woelflin, 1965; Hackman, 1971; McCoy, 1962; J. Y. Brown and R. R. Carter, 1970; J. R. Kennedy, 1970; Revill, 1970; and Evans, 1969).⁶ Lack of the required library information-

⁴ Allan Mirwis, "Academic Library Instruction - a Bibliography, 1960-1970," Drexel Library Quarterly, Vol. VII (July-October 1971), 327-335.

⁵ Shirley Hopkinson, Instructional Material for Teaching the Use of the Library - A Selected Annotated Bibliography of Films, Filmstrips, Books and Pamphlets, Tests and Other Aids (San Jose, California: Claremont House, 1966).

⁶ Leslie E. Woelflin, "To Determine the Effectiveness of Programmed Instruction in Teaching Third, Fourth and Fifth Grade Children How to Use the Card Catalogue," Final Report on Research Conducted Under Bureau Number 5-8080, U.S. Office of Education (Carbondale, Illinois: Southern Illinois University, June 1965 - December 1965); Martha Hackman, information corresponding to that given for Woelflin; Ralph E. McCoy, information corresponding to that given for Woelflin; Jeanne Y. Brown and Robert R. Carter, information corresponding to that given for Woelflin; James R. Kennedy, information corresponding to that given for Woelflin; D. H. Revill, information corresponding to that given for Woelflin; Roy W. Evans, information corresponding to that given for Woelflin.

retrieval skills has been noted among pupils ranging from elementary school through to and including university students (Hartz, 1966; Perkins, 1970; and Hieber, 1966);⁷ among teachers (Hartz, 1966; Cecily Brown, 1957; and Gaver, 1962);⁸ and among personnel in industry (Davis, 1971).⁹

There appears to be a dearth of articles and systematic research on attitudes toward the library and toward information retrieval. Felton (1971) indicates that research in attitudes toward information of scientists, and in the behavioral sciences is inconclusive, and that little or no research has been done on attitudes toward information in the social sciences, the humanities, or in business.¹⁰

⁷ Frederic R. Hartz, "Secondary School," Journal of Secondary Education, XLI (May 1966), 201-205; Ralph Perkins, information corresponding to that given for Hartz; Caroline Hieber, information corresponding to that given for Hartz.

⁸ Hartz, 1966; Cecily Brown, information corresponding to that given for Hartz; Mary Virginia Gaver, information corresponding to that given for Hartz.

⁹ Diana L. Davis, "New Approaches to Library Use," Drexel Library Quarterly, Vol. IX, n. 1 (January 1971), 4-12.

¹⁰ Suzanne Y. Felton, "Attitudes and Values Associated with Information," Drexel Library Quarterly, Vol. VII, n. 1 (January 1971), 42-47.

Rosenberg (1966, p. 196) indicates that ease of use is one of the most significant factors influencing the behavior of library users.¹¹ Gaver (1971, p. 63) agrees that accessibility of information is crucial to the success of the library and library use.¹²

Studies have been carried out on students' attitudes toward learning, toward school, toward achievement, but not specifically toward the library. Various factors influencing students' attitudes are: social class (Backman and Secord, 1968);¹³ "important others" including peers, parents, teachers, and other adults (Brookover and Erickson, 1969, pp. 68-109; and Coleman, 1965).¹⁴ Allen (1960, pp. 65-80) and Sharples (1969, pp. 72-79) noted age variables and sex variables in attitudes toward school.¹⁵ Personality factors also influence

¹¹ Victor Rosenberg, "The Application of Psychometric Techniques to Determine the Attitudes of Individuals Toward Information Seeking," Studies in the Man-System Interface in Libraries, Report No. 2 (Bethlehem, Pennsylvania: Centre for Information Sciences, Lehigh University, July 1966), p. 196.

¹² Mary Virginia Gaver, Services of Secondary School Media Centres: Evaluation and Development (Chicago: American Library Association, 1971), p. 63.

¹³ Carl W. Backman and Paul F. Secord, A Social Psychological View of Education (New York: Harcourt, Brace and World, Inc., 1968).

¹⁴ Wilbur B. Brookover and Edsel E. Erickson, Society Schools and Learning (Boston: Allyn and Bacon, Inc., 1969), pp.68-109; James S. Coleman, information corresponding to that given for Brookover and Erickson.

¹⁵ E. A. Allen, "Attitudes of Children and Adolescents in School," Educational Research, III (1960), 65-80; Derek Sharples, information corresponding to that given for Allen.

attitudes toward school along introversion-extroversion and neuroticism lines (Entwistle and Cowell, 1971, pp. 85-90; Backman and Secord, 1968, pp. 36-39).¹⁶ Certain of these factors will also influence student attitude toward use of the library. A student who is a "loner" will form his own attitudes toward the library. Peer-motivated students will be influenced by what the group does or feels toward library use. Backman and Secord (1968, p. 47) sum it up well when they say that "The most important factor in educational achievement [and this includes the library as well] is that the child must repeatedly experience success in his school endeavors. This builds appropriate abilities, study habits, attitudes and values, and minimizes those factors that interfere with performance."¹⁷

Many articles on library use or instruction make statements about people's attitudes toward the library, but these statements are not supported by scientific investigations in the area. They are simply suppositions of writers or statements taken from interviews with librarians and other people.

¹⁶ M. D. Cowell and N. T. Entwistle, "Personality, Study, Attitudes and Academic Performance in Technical College," British Journal of Educational Psychology, Vol. XLI, Part I (February 1971), 85-90; Carl W. Backman and Paul F. Secord, information corresponding to that given for Cowell and Entwistle.

¹⁷ Backman and Secord, p. 47.

James R. Kennedy (1970, p. 1453) states that "The sad fact is that for most students the library is little more than a study hall."¹⁸ Taylor (1967, p. 3) quotes an information specialist who says, "The levels of frustration in using libraries are awfully high for most people ... The library is the last place they want to go because they've been conditioned ... " by frustrating experiences there.¹⁹ Shores and Snoddy (1971); Perkins (1970); and C. Brown (1970) indicate that teachers have a low regard for information-retrieval skills and imply that the reason may be a lack of knowledge in the use of these skills on their own part.²⁰ C. Brown (1970, p. 3) states that the lack of teacher use of libraries influences the attitudes of their pupils toward the library so that they don't want to use libraries themselves. She goes on to say that teachers and administrators show a lack of regard for the true value of the library since they consider it

¹⁸ James R. Kennedy, Jr., "Integrated Library Instruction," Library Journal, XCV, no. 8 (April 15, 1970), 1453.

¹⁹ R. S. Taylor, "Question-Negotiation and Information-Seeking in Libraries," Report No. 3 (Bethlehem, Pennsylvania Centre for Information Sciences, Lehigh University, July 1967), p. 3.

²⁰ J. Harlan Shores and James E. Snoddy, "Organizing and Teaching the Research Study Skills in Elementary Schools," Elementary English, XLVIII (October 1971); Ralph Perkins, information corresponding to that given for Shores and Snoddy; Cecily Brown; information corresponding to that given for Shores and Snoddy.

"a thing apart ... a place to which children go to borrow books."²¹ Librarians are partly to blame for displaying a lack of enthusiasm for not trying hard enough to change the image of the role of the library and their own roles (C. Brown, 1970, p. 15).²² From this subjective evidence one can surmise that many people hold negative attitudes toward the library and that the task of changing these attitudes is a difficult one.

Another area in which there seems to be a lack of sound research is on follow-up activities in practising library skills which youngsters have already encountered in their school experience. As previously mentioned, in the RCOLP project increased pupil motivation improved performance. This writer feels that by the use of a game on information retrieval, students can be motivated to improve their performance in library skills as well as improve their attitudes toward the library. Boocock and Schild (1968, p. 255) support the use of games for learning. "The lore of games research is full of exciting instances of learning breakthroughs..."²³

²¹ Cecily Brown, "Libraries and Education," Quarterly Review of Australian Education, III, n. 3 (September 1970), p. 3.

²² Ibid., p. 15.

²³ Sarane S. Boocock and E. O. Schild, Simulation and Games in Learning (Beverly Hills: Sage Publications, 1968), p. 255.

Tansey and Unwin (1969, p. 7) state that "As far as participants are concerned the games are seen as pleasant experiences that cause a high degree of commitment and involvement. Students are highly motivated..."²⁴ Sprague and Shirts (in Tansey and Unwin, 1969, p. 20) have suggested that "Our goals for education should be to help people become enthusiastic, to assist them in learning how to learn, and to provide them with the resources and aids which are necessary to further their opportunities to learn ... Games are a great deal of use in the furtherance of these aims."²⁵

Jerry Fletcher (1971) in "The Effectiveness of Simulation Games as Learning Environments" refutes most statements of the supporters of game theory on the grounds that most of their claims of what games can do for learning are untested hypotheses, and he calls for more serious research in the area (Fletcher, 1971 [b], p. 450).²⁶

Most of Fletcher's points refer to simulation games which (a) have been untested, (b) have not been "de-bugged", (c) claim to do certain things but in fact those objectives can never be met, and so on. The game which this writer proposes for use for experimentation purposes, called "Treasure Hunt", has in fact gone through two "de-bugging" sessions.

²⁴ P. J. Tansey and Derick Unwin, Simulation and Gaming in Education (Toronto: Methuen Educational Ltd., 1969), p. 7.

²⁵ Tansey and Unwin, p. 20 quoting M. T. Sprague and Gary R. Shirts, Exploring Classroom Uses of Simulation, La Jolla, California, Western Behavioral Sciences Institute, October 1966. (Mimeographed.)

²⁶ Jerry L. Fletcher, "The Effectiveness of Simulation Games as Learning Environments," Simulation and Games, II, n. 3 (December 1971[b]), p. 450.

In the pre-research trials, several revisions of the content of the game were carried out until participants were able to understand what the material was all about and were able to perform the different tasks involved quickly and effectively. Personality differences were taken into account in setting up different types of activities and in providing the opportunity for intrinsic and extrinsic reward. Comments from the eleven- and twelve-year-old participants were favourable, claiming that they enjoyed the entire experience, found the tasks meaningful, and wanted to have more time to participate even though they had already played for more than an hour. Competition is used as a stimulant; however, it is not played up to an extreme. There are no intended penalties applied in the game. The winner is the one of the six participants who accumulates the most points. However, at the end of play all participants in the experiences receive a pin as a reward simply for their participation. No special reward is given the winner except his own self-satisfaction and recognition by other players of his success. The writer has tried to avoid as many as possible of the pitfalls which Fletcher (1971,b) mentions.²⁷ "Treasure Hunt", a game developed by this writer, is not aimed at teaching specific skills; rather its main purpose is to provide youngsters with a pleasant yet meaningful medium to practise skills which they have previously learned, and thereby reinforce that learning; in short, to

improve attitudes and skills generally related to resource
centre use.

²⁷ Fletcher, December 1971 (b).

CHAPTER II

EXPERIMENTAL DESIGN, MATERIALS AND METHODS

2.1 Statement of Hypothesis

Pupils (in particular those who are peer-group motivated as contrasted with "inner-directed" students) who participate in a game of information retrieval will develop more positive attitudes toward the resource centre/library* and will perform better on information-retrieval tasks than students who do not participate in the game.

2.2 Population and Sample2.2.1 General Approach

The target population for this project consists of suburban middle-class pupils such as those found in Crestview and Valois Park Elementary Schools, schools used for experimentation in the RCOLP Project. Because of the competitive nature of the game and the inclusion of a range of activities from simple to complex, and the necessity for active participation on the part of participants, the most suitable subjects would be those who like challenge, active participation, and who exhibit fairly low anxiety levels.

*Note: The terms "resource centre" and "library" are used interchangeably in this thesis.

Other necessary pupil characteristics are that they should:

1. not be emotionally disturbed;
2. not have a language problem as, for example, immigrant children;
3. not be introverted with high anxiety levels (Backman and Secord, 1968, pp. 28-47);²⁸
4. include peer-motivated or "other-directed" traits as well as loners or pupils with "inner-directed" traits (Reisman et al., pp. 17-26);²⁹
5. have a reasonable attention span of about one hour or more;
6. be eleven or twelve years old;
7. attend schools similar to Valois Park and Crestview, schools which have libraries fairly typical of most school libraries in the Montreal Protestant School System with four to five thousand volumes, and part-time librarians.

The group chosen for the RCOLP project and for the present study consists of elementary school children in grades VI or VII and aged eleven to twelve years. The reason for the choice of this particular group is that the skills involved in the resource centre game have, to some degree, already been internalized or experienced by students of this

²⁸ Backman and Secord, pp. 28-47.

²⁹ David Reisman, Nathan Glazer and Reuel R. Denney, "Tradition-Direction, Inner-Direction, and Other-Direction," in Selected Educational Heresies, ed. by William F. O'Neill (Glenview, Illinois: Scott, Foresman and Co., 1969), pp. 17-26.

age and grade level. Also, students older than eight years can read without difficulty and students younger than fourteen are supposedly not consumed by social problems (Coleman, 1965).³⁰ Another consideration is that pupils aged twelve years "according to Piaget," (Borger and Seaborne, 1967, p. 95) should be able to operate or reason on an abstract formal level.³¹

For the present study, a true random sample of pupils was chosen from among the population of students of grades VI and VII at Gardenvue School in suburban Ville St. Laurent. Out of one hundred and sixty students seventy-two were chosen, of which thirty-six represented the experimental group and thirty-six comprised the control group.

Characteristics to be taken into account in the choice of the experimental population were the differences in student personality, that is, whether participants were introverted or extroverted and whether students of those categories fell into the stable or unstable classification. These characteristics correlated with high or low need achievement result in high or low anxiety levels influencing performance of tasks of an academic nature (Backman and Secord, 1968, pp. 28-47).³²

³⁰ James S. Coleman, The Adolescent Society (New York: Basic Books, 1965).

³¹ Robert Borger and A. E. M. Seaborne, The Psychology of Learning (Middlesex, England: Penguin Books, 1967), p. 95.

³² Backman and Secord, pp. 28-47.

"Anxiety was found to facilitate the academic performance of ... [students] of ... high ability but not the performance of those with low or average ability; the remaining students experience difficulties and failures which further impair their performance under tension ... " (Backman and Secord, 1968, p. 38).³³ Another variable considered was the individual differences in the degree of skills actually present in this age group stemming from various sources, including lack of a consistent and effective instructional program in the use of libraries.

Other factors cited in numerous reference materials including Backman and Secord (1968) and Brookover and Erickson (1969) as influencing attitudes toward learning and achievement include students' potential abilities, academic achievements, parental interest in learning (often an offshoot of social class),³⁴ and the degree of influence of "significant others" (parents, peers, teachers) on attitude toward learning (Brookover and Erickson, 1969, pp. 68-109).³⁵ Difference in attitudes toward learning and project assignments can also be a function of the differential reinforcement by teachers, some of whom would accept any "trash" with no distinction between poor and good work and who provide no

³³ Backman and Secord, p. 38.

³⁴ Backman and Secord, 1968; Brookover and Erickson, 1969.

³⁵ Brookover and Erickson, pp. 68-109.

recognition for students who make an effort to hand in fine work. On the other hand, teachers who set high standards of work and provide positive reinforcement for work well done may affect a pupil's performance and attitudes toward school due to the motivation of the high standards demanded and the interest displayed by such a teacher. However, this influence (as has been noted) depends on the degree to which a teacher is considered a "significant other" by any particular youngster.

While experimenting in the school, this researcher observed the nature of the school, classroom, and library climates.* Observations of students in their classrooms were conducted so as to categorize their behavior, their personality types, their ability, and to determine the general attitudes of students toward school and learning, toward use of the library (by on the scene observation), and toward the staff involved, though indirectly, in the study. Another point of observation was the social relationships between fellow students and classmates, since whether a student is peer-influenced or a self-motivated loner has a great effect on attitudes and achievement. Information pertaining to the above was obtained by private discussions with teachers, librarians, and the principal, and alternatively by using the school records of students.

*The experimenter recorded all observations of activities, events, and comments as they occurred in a Laboratory Book. Excerpts are cited further on in the text.

2.2.2 Choice of School

The reasons for the selection of Gardenview School for the experiment were several. Firstly, the library at Gardenview School is fairly large, having more than five thousand volumes. However, more importantly, the library is neat, orderly, well-organized and, in addition, books for the most part are located in their proper places. Mrs. Dempster, the librarian, in addition to having good interpersonal relations with pupils, also runs a "taut ship". Materials are required to be replaced in their proper niches, and a certain level of decorum is maintained, though this by no means implies silence. Since the policy at Gardenview for the past eight years has been one of an open or free library, pupils have access to it at all times. However, this free-access policy supplants a formal program of library instruction. The librarian believes that this leaves a serious gap in skills and knowledge-building. This gap in library orientation and instruction was, in theory, to have been filled by the individual teachers. It has not been. Most pupils have received no formal library instruction at all. For this reason, the author felt that the grades VI and VII pupils of Gardenview should be an excellent choice as the target population for the project. It was the belief of this researcher that the level of skills of the pupils was probably as uniform as possible in a regular school situation since no

pupils had received instruction at the school. Learning of library skills thus far may have been achieved through trial and error, or by occasional requests for assistance from the librarian in locating reference materials for specific projects.

2.2.3 Selection of Subjects for Study

The class lists of three grade VI classes and two grade VII classes were obtained. Pupils' names were numbered from 1 to 160. Subjects were chosen by following the procedure outlined in Downie and Heath (1970, p. 159)³⁷ and using the table of random numbers (Downie and Heath, 1970, p. 329).³⁸ Seventy-two subjects were selected according to these instructions for participation in the study. In addition, the assignment of subjects to the experimental and control groups was accomplished using the same procedure.

Through consultation with class teachers and the principal, and by using school records, pupils not meeting the criteria mentioned previously were excluded from participation. One was a girl, a low achiever, frustrated, defensive, and very self-conscious about her lack of ability. The second was a boy who was emotionally disturbed and constantly under sedation. The third was a young girl who was typed as a high anxiety high achiever. She was extremely nervous and so

³⁷ Norville Morgan Downie and Robert William Heath, Basic Statistical Methods (3rd ed.: New York: Harper and Row, Publishers, 1970), p. 159.

³⁸ Ibid., p. 329.

emotionally unstable that she cried at her slightest error or at the slightest hint of disapproval. These three were replaced by other subjects chosen randomly, using the same procedure as before. Two other candidates selected were considered for deletion. One boy was under psychiatric care and on sedatives. However, he was not excluded since his teacher felt that he would be able to handle the situation without any adverse psychological or emotional consequences. (As it turned out, his teacher's prediction was accurate.) Another boy, a grade VII student, was described by his teacher and other staff members as very extroverted and extremely negative in his attitudes. However, it was decided, on his teacher's recommendation, that he should be allowed to participate nonetheless.

According to the staff members involved and according to data on the pupil-record files, pupils comprising both the experimental and control groups were considered very much alike regarding the range of personalities and temperaments, skills, high and low academic need achievement, and ability (that is, verbal I.Q. scores and reading levels).³⁹ This was very encouraging.

With regard to the language problem criterion previously mentioned, some concern developed over three chosen

³⁹ Yetta Garellek, Laboratory Notebook, unpublished record of observations of the Information-Retrieval Study, April 8, 1972.

children who were fairly new to Canada, a Chinese girl, an Israeli boy, and a Greek boy. But their teachers had confidence in their ability to participate and handle the tasks involved in the project and, as a result, these children were not excluded.

2.3 Description of the Enquiry Game

The game called "Treasure Hunt" developed by this writer is a game of information-retrieval skills to be played in the library itself. It is composed of a series of questions and problem-solving activities which require the use of various library skills already encountered by students in their previous school experience. The goal of the players is completion of as many tasks as possible and accumulation of a maximum number of points within the time period allowed.

The game is designed for up to six players to participate, each working on individual activities. The game is administered by one person, in this case the experimenter, who serves both as scorekeeper and timekeeper simultaneously.

The physical makeup of the game is somewhat similar to "Monopoly", but that is where the similarity ends. Equipment includes a playing board, playing pieces, dice, a kitchen timer, scoring sheets, answer sheets, a master sheet of all answers for use by the administrator, and three sets of cards (corresponding to the three types of squares on the board): Activity Cards, Question Cards, and Chance Cards, each set

of which has its position on the board. A fourth type of card included in the game is a set of yellow Clue Cards.

The following is an explanation of the different types of cards used in the game. Pink Question Cards require pupils to find answers to fairly straightforward questions usually requiring the use of one source of information.⁴⁰ Orange Activity Cards consist of tasks which are more complicated, requiring the location and use of information in more than one source.⁴¹ The functions of the blue Chance Cards and yellow Clue Cards are more complicated and require more specific explanations. The blue Chance Cards include some which give away points but none which hand out penalties, as well as other cards which give instructions in library use.⁴² The latter type includes reminders about: how to use the card catalogue; use of clue words; alphabetizing; knowledge of synonyms and antonyms; different types of reference material available in the library, and so on. Yellow Clue Cards belong with certain Problem-Solving Activities found among the orange Activity Cards.⁴³ These include activities such as "How to do or make something," "Why," "How," and the like. In these

⁴⁰ See Appendix B2 for examples of Question Cards.

⁴¹ See Appendix B1 for Activity Cards.

⁴² See Appendix B3 for Chance Cards.

⁴³ See Appendix B4 for yellow Clue Cards and Problem-Solving Activities.

tasks the aim is for the student to follow the instructions found on the orange Activity Card under "Clue 1", and to trace the information to selected references in which the answer to part of the problem is located and in which yellow Clue Card 2 is sequestered. Yellow Clue Card 3 is found by following the instructions on Clue Card 2, and so on. Each Clue Card represents one part of the problem. Answers to all aspects of the task must be written on answer sheets.⁴⁴ In addition to information, the yellow Clue Cards also bear stickers. The child must take one sticker from each Clue Card he has located as well as provide written answers to the various aspects of the problem which are handed in to the scorekeeper in return for points. This type of activity presents a challenge to the participant requiring him to trace one reference to another, find correct answers, and so on, determining his ability to organize his thinking and to follow directions as well as to use effectively the information-retrieval skills.

Play consists of completing as many retrieval activities as possible during game time in the library to accumulate as many points as possible. Play begins by tossing the dice to determine who goes first, second, and so on. All players in order toss the dice and move their pieces from the starting

⁴⁴ See Appendix C2 for answer sheets.

square and along the board to the appropriate squares and choose the designated cards from the three decks. After all six youngsters have chosen their tasks, the timer is set for fifteen minutes. During each time period, a pupil tries to complete his task and begin another to attempt to gain a lead over other players. However, at the sound of a fifteen-minute bell, all players must return to the board, whether a task is completed or not, and hand in answer sheets and stickers (if they have any) to the scorekeeper in order to tally up the results. Then a new round of play is begun for which the procedure has been described. The total time of play is between one hour to one hour and a half.

Positive reinforcement is provided in various forms. Some blue Chance Cards offer points for free in order to even up the chances for success of less able students versus brighter ones. Yellow Clue Cards offer positive rewards by giving the participant a verbal pat on the back for having found the necessary information and for being on the right track.

Two important conditions governing the entire exercise are: first, that the game be located in the actual library/resource centre environment, and second, that real library skills are involved although participants are not aware that these skills play a major part in the whole experience.

Other skills besides retrieval skills are being utilized. While participating in the game activities, pupils will have to ask themselves questions such as: What do I need to know? How can I find out? Now that I have several references, which are most relevant to my needs? These questions over which the youngsters will be pondering are part of the critical thinking process involving analysis, selection, synthesis, evaluation (Taba, 1962, pp. 215-220),⁴⁵ and so on. Therefore, one can surmise that besides practising library skills, other skills and faculties are being called upon as well.

Instructions on how to play the game are explained as well as demonstrated to participants. A sheet of simple instructions is provided for each pupil before he plays.⁴⁶ In addition, the experimenter explains the rules and demonstrates the more complex aspects of the game. In the Problem-Solving Activities pupils are required to trace Clue Cards sequestered in references leading them from one source to another. Problems are broken down into several segments. Such an activity might be "How to build a bird house." The information required and traced from reference to reference would include: (a) the type of bird for which the house is intended; (b) the style of bird house; and (c) the carpentry

⁴⁵ Hilda Taba, Curriculum Development: Theory and Practice (New York: Harcourt, Brace & World, Inc., 1962), pp. 215-220.

⁴⁶ See Appendix C1 for the pupils' sheet of instructions.

involved. As a final step in the orientation process (if it is deemed necessary), a demonstration group or model team of pupils and/or the experimenter skilled in the game procedure can provide an example which participants can imitate.

Provision has been made in the game as far as possible for personality differences of participants on the introversion-extroversion dimension and for neuroticism factor, that is, stability-instability and high and low anxiety. Different types of reinforcements have been implemented. Timed activities have been used so that a youngster unsuccessful at one task has other opportunities to perform better. No negative or punishing elements have been employed. Frustration, however, could be a factor if a pupil cannot perform a task under pressure of time, but another result could be increased determination to do better on the next activity. This is, to some extent, obviated by the pacing of the game which sends a child on to a new activity before a really high level of frustration can build up. Moreover, there are a number of free-gift activities so that even a pathetically unskilled child gets a respectable number of satisfactions.

2.4 Experimental Design

2.4.1 Statement of Procedures

The experimental design is a two-group pretest-posttest design (see Table 1) and follows the course outlined below. Out of the total population of grade VI and VII

students at Gardenview School, numbering about 160 pupils, a random sample of seventy-two children was selected by using a table of random numbers. Thirty-six served as the experimental group and thirty-six constituted the control group. All students completed the entire procedure so that there was, in fact, no wastage. Both groups were given a pretest and posttest Attitude Questionnaire, recorded on audio-cassettes, and a short Paper and Pencil Attitude Test. The interval between the pre- and posttest situations was a period of approximately one month in duration.

TABLE 1
EXPERIMENTAL DESIGN

Operation	Groups	
	Experimental	Control
Pretest	1. Attitude Interview 2. Paper and Pencil Attitude Test	1. Attitude Interview 2. Paper and Pencil Attitude Test
Treatment	Game Sessions "Treasure Hunt" 1. Trial I 2. Trial II	Game Sessions 1. "Careers" 2. "Monopoly"
Posttest	1. Attitude Paper and Pencil Test) 2. Attitude Interview) 3. Performance Test)	* 1. Attitude Paper and Pencil Test 2. Attitude Interview 3. Performance Test

* Several terms are used interchangeably in the text to represent each of the testing instruments used: (a) Attitude Test, Paper and Pencil Attitude Test, PAPT, and Written Attitude Test; (b) Attitude Interview, Interview, Attitude Questionnaire; (c) Performance Test, Skills Test, Library Skills Test, and Information-Retrieval Test.

2.4.2 Measuring Instruments

The pretest and posttest Attitude Interview was composed by the experimenter after consultation with references on questionnaires and their wording (Oppenheim, 1966; and Payne, 1951). The Interview recorded on audio-cassettes consisted of fourteen questions concerned with attitudes toward the library.⁴⁷

It was hoped that the items included in the Interview would provide a basis for personal appraisal of participants' attitudes. The objective was to find out pupil attitudes by asking about various aspects of the library and assessing all aspects together in order to arrive at a good evaluation of what the attitudes of subjects were really like. In addition to response, tone of voice and expression were considered when tabulating any pupil's attitudes.

Assessment of attitude was completed by the experimenter and by another competent individual, a Sir George Williams University undergraduate student, who served as research assistant for the entire study. Upon playback, the "raters" specified their estimates of the pupils' attitudes toward the library and library use, using specially prepared scales.⁴⁸ A simple five-point scale was used such as the one following.

⁴⁷ See Appendix D1 for Attitude Interview Questionnaire.

⁴⁸ See Appendix D2 for the Attitude Interview assessment sheet.

FIVE-POINT SCALE

5	4	3	2	1
very positive	positive	1. unsure 2. some- times yes, some- times no 3. don't know	negative	very negative

The use of this scale by the two raters was aimed at converting subjective answers into numerical, measurable form.

Evaluation of each taped Interview was done independently of the other by the two raters, producing two subjective opinions as to the state of the attitudes of any one subject. The decision of negative, neutral, or positive attitudes of the students was made after listening to the Interviews. Finally, these two opinions were compared with the teachers' overall estimates of pupil attitudes in order to determine consistency between the ratings. Teachers rated attitudes of pupils toward the library on a three-point scale, illustrated below, corresponding to the values 4, 3 and 2 of the experimenters' five-point scale:

THREE-POINT SCALE

4	3	2
positive	neutral	negative

Interview ratings and scores on the Paper and Pencil Test were to be utilized as cross-checks against each other to determine the validity of the tests and items. Both groups were given a pre- and posttest Paper and Pencil Attitude Test in which the students judged their own attitudes toward library use and information retrieval.⁴⁹ This test was devised by K. Kennedy, G. Iwasechko, and Y. Garellek and was composed of twelve short attitude statements, patterned after those of the Purdue Master Attitudes Scales. The scoring was derived from the idea of Buxton's scale (1966), a Likert-type scale (Nisbet and Entwistle, 1970, p. 129).⁵⁰

2.4.3 The Pilot Study (Reliability and Validity)

A Pilot Study was carried out by G. Iwasechko to determine the reliability and validity of the Attitude Paper and Pencil Test; the data follows.

To validate the Attitude Test, a sample of 284 pupils was used. The subjects were primarily grade VI students interspersed with some grade VIII students having characteristics similar to the target population of the present research.

⁴⁹ See Appendix E2 for the Paper and Pencil Attitude Test, and the Likert-type Self-Rating Scale for the pupils.

⁵⁰ John Donald Nisbet and Noel James Entwistle, Educational Research Methods (London: University of London Press, 1970), p. 129, quoting from C. E. Buxton, "Evaluations of Forced Choice and Likert-type Tests of Motivation to Academic Achievement," British Journal of Educational Psychology, XXXVI (1966), 192-201.

Results of a Pearson correlation coefficient show that out of twelve questions, five needed to be eliminated. These five items, questions numbered 4, 6, 8, 11, and 12, had low or negative correlations ($p < .1$). The questions remaining had correlations between 0.450 and 0.349, all significant at the .001 level.

Another Pearson correlation was done to compare teachers' evaluations of pupil attitudes with the seven remaining questions. Teacher evaluations were obtained for only 191 out of the 284 subjects.⁵¹ However, the correlation coefficients between teacher ratings and the pupil-scored items ranged from a high of 0.790 down to a low of 0.498 (all significant at the .001 level). The good correlation between teacher evaluations and the items on the Attitude Test indicate that the test has validity for measuring attitudes.

An Item Analysis shown further on supports the findings about the retention or deletion of certain questions.

Reliability of the test is determined by administering the same test to the same people after an interval of time (about two weeks). The result is two scores which should be as similar as possible. The more alike the scores, the more reliable the test.

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See Appendix F1 for teacher evaluation of pupils' attitudes during the Pilot Study.

Results of the pre- and posttest Attitude Test scores of the control group (N = 36) of the present study yielded data which show the test to be reliable. Scores indicate no significant difference between the pre- and posttest situations ($p > .1$). (See Chapter III, Table 3 in the text).

2.5 Statement of Procedures

2.5.1 Treatment Pretests

To introduce the pupils to the purpose and activities involved in the research, a "pep" talk⁵² was given to each of the pupils selected in order to obtain their consent or refusal to participate. All seventy-two pupils agreed to take part in the study.

After the individual "pep" talk, each pupil was interviewed in a prescribed manner regarding his/her attitude toward information-seeking tasks. These Interviews were carried out by the author and her assistant and were recorded on audio-cassettes. The Attitude Test described previously was administered. Pupils were required to rate their own attitudes on a five-point Likert-type scale illustrated below:

FIVE-POINT SCALE

5	4	3	2	1
very true of me	usually true of me	don't know	usually untrue of me	very untrue of me

⁵² See Appendix I for the "pep" talk.

The instructions for the Paper and Pencil Attitude Test⁵³ were explained, and the test itself was administered to all the 160 pupils in the five designated classes by the experimenter and her assistant to ensure uniformity of administration.

On two different occasions the experimental group played the game "Treasure Hunt" with the experimenter. The difference between the scores on their first and second trials of "Treasure Hunt" would indicate whether or not their performance had improved significantly. At the same time, the research assistant worked with the control group which played "Careers" first, and "Monopoly" on the second occasion. The purpose of this procedure was to provide the control group with as much time, attention, and interaction with the experimenter as the experimental group, thus eliminating the possibility of distortion due to differences of interaction between the groups with the experimenter. The final session one month later was exactly the same for both groups. They were required to complete a simple Information-Retrieval Test as well as undergo an Interview regarding their attitudes toward the library. Then the results of the Interviews and the Skills Test scores were tabulated and compared with those of the experimental group.

⁵³ See Appendix E1 for the sheet of instructions of the Paper and Pencil Attitude Test.

2.5.2 Trial I of "Treasure Hunt"

Trial I of the library game "Treasure Hunt" took two full days. Three teams of six pupils played each day. Each group worked for a one and one-half hour period. The introduction given to the subjects consisted of an explanation of the different aspects of the game and a run-through of the rules (see Appendix C1). Each pupil was given a copy of the rules with which to follow along. Next came a detailed description and demonstration of the Problem-Solving Tasks, and an actual run-through of this type of activity with one demonstration card. One briefing was tape-recorded in full, and a transcription was made of this tape.⁵⁴ After this, the pupils in the six groups played four timed fifteen-minute rounds of the game. Points were awarded and tallied on answer sheets for correct information and for "stickers" discovered by pupils in source materials handed in to the scorekeeper. The person with the most points was considered the winner. But to emphasize the importance of participation rather than just winning, each pupil was given a token.

It was decided not to display game scores during play, since extroverts don't need an ego boost and introverts, slower pupils, and less academically oriented students would feel badly having no scores or low scores, thus producing more damage than benefit.

⁵⁴ See Appendix G for the transcription of a tape-recording of a briefing given by the researcher.

2.5.3 Trial II of "Treasure Hunt"

Prior to the second period of play, the pupils were more familiar with the game, and the orientation time was consequently reduced. For Trial II the composition of the groups was changed to avoid any pupils being negatively influenced by others. Group Number 1 consisted of all players previously listed first in each group in Game I, and so on.

2.5.4 Game Playing Sessions I and II of the Control Group

The control group was given the opportunity to participate in the playing of "Careers" in Trial I and "Monopoly" during Trial II. The research assistant was responsible for this procedure.

Orientation to justify this aspect of the project was administered to each group of six at the start of Trial I. Participants were told that the aim of the game-playing sessions was to improve their powers of critical thinking and reasoning, to increase their ability to organize their thinking and actions, and to improve their ability to take logical and rational decisions.

After orientation, the procedures for Trial I and II followed practically the same course. The rules of both games were explained to answer any procedural questions participants might have, after which pupils played "Careers" and "Monopoly" respectively. One difference which occurred

was that at the end of Trial II the control pupils were asked to fill out the same Paper and Pencil Attitude Test as they had done before.

2.5.5 Posttest Immediate

Each pupil filled out the same Attitude Test for a second time as a posttest to see whether or not the playing of the game had exerted any measurable influence on attitude.

2.5.6 Posttest Delayed

The final session was virtually the same for both groups. The pupils were again interviewed using audio-cassettes to determine whether or not any attitude change toward the utilization of the library and information retrieval had taken place. The attitude change decision was to be arrived at by comparing the first and second taped Interviews.

Evaluation of the Attitude Interviews was done using the form displayed as Appendix D2.⁵⁵ Ratings of the Interviews were completed after termination of the whole series of experimental sessions. Then each pupil was required to perform a simple Information-Retrieval Test based on the one used in the RCOLP study.*

⁵⁵ See Appendix D2 for the form of the Attitude Interview.

* The format for the Performance Test was taken from that used in prior RCOLP project work by Dr. G. Boyd (1971).

2.5.7 The Performance Test

The test consisted of a task in the form of a question or a problem to be completed by the participants. Subjects were given instructions as to procedure. There was a slight difference between the experimental and the control groups in the pretest instructions. The experimental group was told to carry out the tasks according to the search procedures they had used while engaged in playing "Treasure Hunt", whereas the control group was told to use the same procedures they would usually employ for a teacher-assigned research project.⁵⁶

Each individual received a question or problem to research. Topics included:

1. Who was Louis Riel and what was the cause he was fighting for?
2. Why are icebergs considered dangerous?⁵⁷

The Performance Test involved the use of six topics. Originally it was planned that two or three topics at the most would be utilized. In this way the experimenter would have had a great deal of data on the limited number of topics with which to compare the performance of the pupils. This would also have produced more solid data. However, this plan turned out to be unfeasible. As the Performance Test was first being administered, it was noted that other subjects yet to be tested were unavoidably present in the library and

⁵⁶ See Appendix H1 for the Performance Test instruction sheet.

⁵⁷ See Appendix H4 for the list of topics used in the Performance Test.

were observing the procedures carried out by subjects being tested. Through observation and questioning of students who had already completed or were involved in the Performance Test, vital information was being revealed pertaining to the tasks to be done.

Since members of both the experimental and control groups were tested in random order, casual disturbances occurred equally in the experiences of both groups. Therefore, as a result the experimenter decided to increase the number of topics to six and assign these topics at random. This approach, it was felt, would decrease the probability of subjects revealing information pertaining to locations and tactics to participants yet to be tested. One unfortunate result, however, was a smaller amount of data for any one topic than would have accrued had the original plan been followed. The timing of any performance was compared with the times posted by other participants.

The experimenter and her assistant observed and evaluated independently the performance of each individual according to statements on the evaluation sheet.⁵⁸ Questions covered the pupil's ability to utilize the card catalogue, knowledge of the Dewey Classification System, ability to locate relevant printed materials such as reference books, and ability to find various other media such as kits,

⁵⁸ See Appendix H3 for the evaluation sheet used in the Performance Test.

filmstrips, and to select relevant encyclopediae. Also the ability of each pupil to analyze the material collected regarding its appropriateness to a specific topic was appraised. A five-point scale was developed to rate pupils on the activities which each performed. Below is an example of the scale:

FIVE-POINT SCALE

5	4	3	2	1
very capable	capable	fairly capable	incapable	very incapable

The criteria used to assign scale values for each particular question are given in Appendix H2.⁵⁹ Below is an explanation of the procedure for assigning a score, in this instance, to a subject's use of the card catalogue.

There were seven criterion behaviors listed in Appendix H2, number 1, for observation. A pupil who performed all seven, six or five criterion actions would be considered "very capable". A student carrying out four or three procedures would be designated "capable" and would receive four points; one who performed two actions would be marked "fairly capable" and would be given three points; someone completing only one action would receive two points

⁵⁹ See Appendix H2 for the Criteria to evaluate pupils' performances on the test.

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⁵⁹ See Appendix H2 for the Criteria to evaluate pupils' performances on the test.

and be considered "incapable"; a subject who did not complete any operation would be designated "very incapable" and would receive one point. Besides skills, other considerations which might raise or lower a pupil's standing on any task would be: the degree to which he displayed confidence; the degree of competence or to what extent the individual worked quickly and efficiently; the degree to which the individual completed a task in an organized manner (such as collecting all data at once at the card catalogue rather than going back and forth again and again to refer to the catalogue). A similar evaluation procedure applied to all the other aspects of the Performance Test.

The final step was to find out whether or not the major hypothesis was supported or negated. After the experimental procedure was completed, attitude ratings and the skills performance were compared to determine whether or not the experimental group with experience in the resource centre game "Treasure Hunt" had significantly higher Skills Test scores and more positive attitudes toward library use than the control group. This was necessary in order to prove that any differences found were due to the differential treatment given the two groups and not just due to chance. The null hypothesis must be disproved to support the author's thesis.

CHAPTER III

OBSERVATIONS

3.1 Schedule of the Different Stages of the Experiment

Stage one of the experiment involved several activities: On April 8 and 9 all pupils chosen to participate were given a "pep" talk lasting about five minutes (Appendix I). Pupils then had the choice of opting out of the experiment (none did). During the orientation it was stressed that participants should answer all queries as honestly as possible and complete tasks involved to the best of their ability. Emphasis was placed on the fact that information recorded would be used for the project alone, that comments and activities completed were entirely divorced from their school work and that they thus would have no effect on their grades or progress in any way.

Immediately following the "pep" talk, pupils were interviewed regarding their feelings toward (a) the library in general, (b) the librarian, (c) their ability to utilize the library, and (d) toward information-retrieval tasks. These Interviews were recorded on audio-cassettes as previously stated.

On April 25 the Paper and Pencil Attitude Test (PAPT) was administered to all the classes involved by the experimenter and her assistant.

On April 26, 27, May 3, 8, and 9, stage two of the experiment took place. Both groups were given two game-playing sessions. The experimental group played "Treasure Hunt" under the guidance of the experimenter. Meanwhile the control group was supervised by the research assistant. These pupils played the game "Careers" in session one and "Monopoly" during session two.

Three teams were processed per day. Each team had one and a half hours per session, occurring either between 8:50 to 10:20 A.M., 10:30 A.M. to 12:00 Noon, or 1:30 to 3:00 P.M. Instructions and orientation required about twenty minutes, leaving more than one hour for each team to actually play the games. Thus all teams were able to engage in playing the games for four full fifteen-minute timed rounds. During Trial II of the games, orientation time was reduced to less than ten minutes. After playtime, pupils were again asked to fill out the Attitude Test (PAPT) regarding their attitudes toward library use and information retrieval.

Stage three of the research involved another audio-taped Attitude Interview as well as a simple Information Retrieval Performance Test. This aspect of the research was the most time-consuming. Dates of these sessions were May 25, 26, 31, June 1, 2, 5, and 6. The length of time it took subjects to complete the performance test varied from between four minutes to twenty-five minutes per pupil.

3.2 Gross Results and Observations

Gross results of the tests in their initial form are given in the following tables.

TABLE 2
PAPER AND PENCIL ATTITUDE TEST (PAPT)
TOTAL SCORE SUMS⁶⁰

Group	Pretest Score	Posttest Score	
Experimental	1601	1972	t = 11.833 p < .001
Control	1651	1648	t = 0.168 p > .1
	t = 0.855 p > .1	t = 5.822 p < .001	

TABLE 3
ATTITUDE INTERVIEW
TOTAL SCORE SUMS⁶¹

Group	Pretest Score	Posttest Score	
Experimental	1680	1737	t = 3.038 p < .001
Control	1737	1742	t = 0.236 p > .1
	t = 1.419 p > .1	t = 0.254 p > .1	

⁶⁰ For a more detailed analysis of data shown in Table 2, see Appendices J1, J3, J4, J5.

⁶¹ For a more detailed analysis of data shown in Table 3, see Appendices K1, K4, K8, K9.

TABLE 4
PERFORMANCE TEST SCORE SUMS⁶²

Experimental Group	628	t = 0.003	p > .1
Control Group	629	no significant difference	

The three main aspects of the study are displayed in Tables 2, 3, and 4. Analysis of the gross results of the three procedures was as follows:

In Table 2, on the Paper and Pencil Attitude Test (PAPT), the control group showed no significant difference between the gross scores of the pre- and posttests ($t = 0.168$). The experimental group showed a highly significant increase in attitude scores between the pre- and posttests ($t = 11.833$). Since $p < .001$, the latter difference is not attributable to chance. Comparing the experimental group pretest results to those of the control group, no significant difference was shown ($t = 0.855$), indicating that the two groups were similar in their attitudes as measured by the test, implying that they originated from the same population. However, the table shows a great difference between the posttest results of the experimental and control groups. This difference can be attributed to the variation in treatment of the two groups. The results show that the experimental group scored significantly higher than the control group ($t = 5.822$).

⁶² For a more detailed analysis of data in Table 4, see Appendix L.

Table 3 provides the gross results of the Attitude Interview. First, the pretest results show no significant difference between the experimental and control groups ($t = 1.419$). This supports the pretest results of the PAPT by exhibiting similarity of the two groups. Examination of the pre- and posttest results of the control group show no significant change in attitude ($t = 0.236$). The pre- and posttest results of the experimental group, on the other hand, do indicate a significant increase in attitude score on the Interview ($t = 3.038$). This difference can again be ascribed to the difference in treatment that the two groups received. Since $p < .001$, the difference is not attributable to chance. Examination of the posttest results of the two groups indicate no significant difference between their scores ($t = 0.254$). The probability is greater than one in ten ($p > .1$) that the results could have occurred by chance.

The end treatment Performance Test scores are displayed in Table 4. No significant difference is shown between the two groups ($t = 0.003$, $p > .1$) in spite of the difference in treatment.⁶³

However, total scores on the Attitude Interview show that the experimental group did increase its score from the pretest to the posttest situation by 52 points while control group scores displayed only a minor change.

⁶³ See Appendix L for a more detailed analysis.

	<u>Pretest</u>	<u>Posttest</u>	
Experimental Group	1680	1737	+ 52
Control Group	1737	1742	+ 5

There is about a 15% increase in score for the experimental group ($t = 3.038$, $p < .001$) versus a 0.1% increase ($t = 0.236$, $p > .1$) for the control group. However, no significant difference in posttest scores is shown between the two groups ($t = 0.254$, $p > .1$). This experimenter believes that absolute scores are not the essence but rather that relative gain or increase in score is significant because this corresponded to her subjective impressions.

3.3 Subjective Observations

In the view of this experimenter, change in attitude did occur. Observation of the pupils participating in the information-retrieval tasks during Trials I and II of "Treasure Hunt" led their author to believe that improvement in pupils' attitudes toward research tasks had occurred. In other words, from her own contact before and after their game experiences, she detected an increase in enthusiasm and motivation on the part of the pupils. This was corroborated during her observation of these pupils while they were performing the Information-Retrieval Test of the end treatment.

In support of her views, subjective comments on the part of the principal, the librarian, the teachers involved,

and most important of all the experimental group pupils also indicate that there was an improvement of attitudes toward the library. This is documented further on in this chapter.

3.4 Validity and Reliability of Tests Used

3.4.1 The Paper and Pencil Attitude Test

As described in Chapter II, a Pilot Study was carried out to determine the validity and reliability of the Paper and Pencil Attitude Test (PAPT). Out of 284 subjects tested, 191 were selected for the validity study since teachers' evaluations of these pupils' attitudes were available. A correlation between the teachers' estimates of pupil attitudes and scores on the items of the Attitude Test determined the validity of the test items. Eleven out of twelve attitude statements had correlations significant at the .001 level. Only item 11 had no significant correlation with teachers' estimations.

Statements having the highest correlations with the teachers' estimations of pupil attitudes (correlation coefficients ranging between 0.7904 and 0.4653 [$p < .001$])⁶⁴ were items 1, 2, 3, 5, 7, 9, and 10. These statements, because of their high intercorrelations, displayed the highest internal consistency providing an additional reason for utilizing them.

⁶⁴ See Appendix F1 for the Pilot Study data on the correlations between Attitude Test items and teachers' evaluations of the attitudes of pupils.

An Item Analysis was carried out on 116 pupils by Y. Garellek and K. Kennedy to determine whether the test (PAPT) contained any weak items which could then be excluded. It was determined that items 11, 12, and 4 were poor, substantiating the procedure mentioned above (see Table 5).

The Item Analysis was conducted according to procedures advocated by Nisbet and Entwistle (1970, p. 130).⁶⁵ Two criterion groups were utilized. One group was comprised of pupils rated negatively by teachers and having low attitude scores, while the second group was rated positively by the teachers and had achieved high scores on the Attitude Test. This procedure provided the researcher with an index of discrimination (Nisbet and Entwistle, 1970, pp. 88-89). ("For attitude statements an index of discrimination of fifteen percent is usually accepted ... " [Nisbet and Entwistle, 1970, p. 130]).⁶⁶

The following table gives an Item Analysis of 116 grades VI and VIII English Catholic subjects from a suburban Montreal area. Top scores on the scale are 5 and 4. These were the scores used in calculating the results below.

65, 66 Nisbet and Entwistle, p. 130.

TABLE 5
ITEM ANALYSIS

Items	Scores 60-50 Top Third	49-43 Middle	42-19 Bottom Third	Index of Discrimination
1	94%	67%	32%	62%
2	97%	100%	63%	34%
3	88%	75%	33%	55%
4	94%	87%	75%	19%
5	88%	85%	38%	50%
6	80%	55%	40%	40%
7	97%	83%	53%	44%
8	80%	43%	17%	63%
9	86%	53%	18%	64%
10	78%	70%	18%	60%
11	92%	75%	68%	24%
12	100%	98%	75%	25%

Evidence indicating the reliability of the Attitude Test (PAPT) was provided by pre- and posttest results of the control group of the present research. Since no significant difference was shown ($t = 0.168$) between the results of the two groups on the test given (with an interval of nineteen days between the two occasions), one can conclude that the test is quite reliable.

3.4.2 The Attitude Interview

The Interview was composed of fourteen questions* which were designed to determine the attitudes of pupils

* In the posttest situation the experimental group pupils only were asked 18 questions. Questions 14-18 were added to determine their attitudes toward 'Treasure Hunt'. The control group were interviewed in the posttest on only the first 14 questions.

toward the library. Questions dealt with three areas including pupil skills, opinions, and feelings toward: (a) the library, (b) personnel, and (c) information-retrieval assignments. One pilot run using fourteen questions was carried out by G. Iwasechko on twelve- and thirteen-year-old pupils.* It was found necessary to revise the questions to increase clarity and pupil understanding. After this, no further revision of the questions was carried out. The revised questions are those appearing in Appendix D1.

To test the validity of the Interview questions, a Pearson correlation was done to compare the questions with the Gardenview teachers' estimates of attitudes. Most questions, when compared with the teachers' estimates, had correlation coefficients which were nonsignificant, greater than 0.1 (question 3, $p = 0.130$; question 5, $p = 0.233$; question 6, $p = 0.110$; question 7, $p = 0.198$; question 9, $p = 0.178$; question 11, $p = 0.117$; question 12, $p = 0.237$; question 13, $p = 0.398$). Low correlations of close to 0.05 and between 0.05 and 0.1 are found between the Gardenview teachers' estimates and (a) question 1 ($p = 0.076$); (b) question 2 ($p = 0.037$); (c) question 4 ($p = 0.089$); and (d) question 9 ($p = 0.048$).⁶⁷ However, there was a correlation of teachers' estimates of attitudes and pupils feelings

* A tape recording was made of the Interview by Mr. Iwasechko.

⁶⁷ See Appendix M for the correlation coefficient between Gardenview teachers' evaluations of the attitudes of subjects and Interview questions.

toward the librarian, $t = 0.349$ ($p = 0.002$). In general, however, Gardenview teachers' estimates of attitudes were not correlated with pupils' scores on the Paper and Pencil Test either, although the PAPT test did correlate with teachers' appraisals at the other schools.⁶⁸

Internal consistency of the Interview question ratings is illustrated by the Pearson correlation. Variables 1 to 7 represent questions 1 to 7, however variables 8 to 13 represent questions 9 to 14. Question 8 was excluded due to its nonadaptability to being measured by the five-point scale.

In the Pilot Study, the correlation between teachers' estimates of pupil attitudes and scores on items 1, 2, 3, 5, 7, 9, and 10 was high, between 0.790 and 0.464 ($p < .001$). However, the estimates of pupils' attitudes by Gardenview School teachers on these same Attitude Test items show low correlations with (a) PAPT item 3 ($p = 0.031$); (b) PAPT item 5 ($p = 0.097$); and (c) PAPT item 7 ($p = 0.060$). Non-significant results occur when comparing these teachers' estimates with (a) PAPT item 1 ($p = 0.134$); (b) PAPT item 2 ($p = 0.115$); (c) PAPT item 9 ($p = 0.308$); and (d) PAPT item 10 ($p = 0.394$). There is strong evidence to disregard the estimates of attitudes of the Gardenview teachers involved in the study, since this group of teachers was not typical of the larger population of teachers compared with the sample of

⁶⁸ See Appendix F3 for the correlation coefficients between Gardenview teachers' evaluations and PAPT items.

educators used in the Pilot Study. Therefore, the experimenter could not use Gardenview teachers' estimates of attitudes to validate the Interview items.

Internal consistency of the Interview items was determined via the same Pearson correlation. Items with high intercorrelations ($p < .006$) were questions 1, 2, 3, 4, 5, 6, 7, 11, 12, and 14.⁶⁹

A correlation between the Interview items and the best Attitude Test (PAPT) items was carried out. Attitude Interview questions having low or nonsignificant correlations with the Attitude Test items 1, 2, 3, 5, 7, 9, and 10 were eliminated, while Interview questions 1, 2, 4, 5, 6, 7, 11, and 12, having correlation coefficients ranging between the .02 and .001 levels of significance, were retained (see Appendix F2). These questions were then considered as having validity. Interview questions 1, 2, 4, 5, 7, and 11 seemed to be measuring the same things as Attitude Test items 1 and 5 and possibly item 2. Interview questions 3, 9, 10, 13, and 14 were deleted since no significant correlations were found. These latter questions did not seem to measure the same thing as the selected Attitude Test items.

Reliability of the Interview is illustrated by the pre- and posttest results of the control group. The Interview

⁶⁹ See Appendix F2 for internal consistency of Attitude Interview questions.

was conducted on two occasions with an interval of about one month. The results show no significant difference between the pre- and posttest situations. Therefore, the experimenter has assumed that the Interview items were reliable.

The Performance Test was composed of tasks compatible with those involved in "Treasure Hunt". Pupils were required to use library skills or information-retrieval skills to complete these activities. As such, the test required no validation.

3.5 Results from Revised Versions of the Tests

TABLE 6

THE PAPER AND PENCIL ATTITUDE TEST (PAPT)
SUMS OF SCORES
(a) seven items: 1, 2, 3, 5, 7, 9, 10

Group	Pretest Score	Posttest Score	
Experimental	943	1125	t = 9.019 p < .001
Control	958	954	t = 0.355 p > .1
	t = 0.345 p > .1	t = 5.290 p < .001	

TABLE 7

(b) four items: 1, 5, 7, 10

Group	Pretest Score	Posttest Score	
Experimental	525	632	t = 8.116 p < .001
Control	539	546	t = 0.842 p > .1
	<u> </u>	<u> </u>	
	t = 1.124 p > .1	t = 4.138 p < .001	

TABLE 8

THE ATTITUDE INTERVIEW
SUMS OF SCORES

(a) eight questions: 1, 2, 4, 5, 6, 7, 11, 12

Group	Pretest Score	Posttest Score	
Experimental	1031	1052	t = 1.733 p < .1 (not significant)
Control	1074	1064	t = 0.597 p > .1
	<u> </u>	<u> </u>	
	t = 1.298 p > .1	t = 0.378 p > .1	

TABLE 9

(b) four questions: 1, 2, 3, 4

Group	Pretest Score	Posttest Score	
Experimental	531	557	t = 2.81 p < .01
Control	545	546	t = 0.111 p > .1
	t = 0.763 p > .1	t = 0.596 p > .1	

TABLE 10

(c) seven questions: 1, 3, 5, 11, 12, 13, 14

Group	Pretest Score	Posttest Score	
Experimental	931	971	t = 4.262 p < .001
Control	979	989	t = 0.737 p > .1
	t = 2.232 p > .01 < .05	t = 0.335 p > .1	

"T" tests were performed on the scores of the validated Attitude Test (PAPT) items 1, 2, 3, 5, 7, 9, and 10. The control group made no significant gains. The experimental group, on the other hand, exhibits significantly increased attitude scores ($t = 9.019$). In the pretest situation there was no significant difference between the experimental and control groups. However, in the posttest situation, the experimental group had made significant gains compared with the control group ($t = 5.290$). This corroborated the conclusions reached from the results of the Attitude Test (PAPT) as a whole. When the scores on the four items (1, 5, 7, 10) of the test which were correlated with Interview questions 1, 5, 11, and 12 were tabulated for both groups, the above conclusions were again substantiated (see Tables 6 and 7).

Tabulation of results of the eight Interview questions 1, 2, 4, 5, 6, 7, 11, and 12 (those which had had the best correlations with the seven Attitude Test items) was carried out. Significant differences were found neither in the pre- and posttest situations of the experimental and control groups, nor between the two groups in either the pretest scores or the posttest results. This finding was a change from the Interview as a whole in which the experimental group was shown to have increased attitude scores in the posttest compared with the pretest.

Further revision was carried out to uncover evidence indicated by the trend in the numerical data (see Tables 8, 9, 10) that a change in attitude did occur among experimental

subjects due to the treatment they had received. The Interview questions (1, 2, 3, and 4) which had inter-correlations of over 0.5 were selected in order to explain this attitude change which, it seemed to the experimenter, was demonstrated by the pupils but was evading measurement by the instruments being employed. The results only substantiated those already established in the tabulations of the Interview Test as a whole. The only change was the increase in attitude scores in the pretest on the part of the experimental group ($t = 2.810, p < .01$).

Chi squares were applied to total values of all the Interview items. However, no significant differences were found between the pre- and posttest results or between the two groups (see Table 11).

TABLE 11
 CHI SQUARE TABLE OF THE TOTALS OF THIRTEEN
 ATTITUDE INTERVIEW QUESTIONS (1-7, 9-14)

Question	Group	Pretest	Posttest	Chi Square	
1	Experimental Control	139 144	148 147	0.0289	p > .90
2	Experimental Control	130 135	133 127	0.155	p < .70
3	Experimental Control	129 134	137 133	0.092	p < .80
4	Experimental Control	133 132	139 139	0.00175	p > .95
5	Experimental Control	120 132	162 127	3.509	p > .05 p < .10
6	Experimental Control	134 134	122 131	0.101	p > .70
7	Experimental Control	135 140	136 132	0.0899	p < .80
9	Experimental Control	105 99	104 97	0.00201	p > .95
10	Experimental Control	120 121	120 122	0.00209	p > .95
11	Experimental Control	121 133	130 137	0.00232	p > .95
12	Experimental Control	118 125	126 130	0.00332	p > .95
13	Experimental Control	153 162	160 166	0.00332	p > .95
14	Experimental Control	143 147	157 157	0.00729	p < .95

at 1 d.f. degrees of freedom

Seven questions (1, 3, 5, 11, 12, 13, and 14), whose pre- and posttest scores showed differences ranging from 7 to 42 points, were utilized in a Pearson correlation (see Table 12).

TABLE 12
TOTALS FOR INTERVIEW ITEMS

Question	Group	Pretest	Posttest	Difference
1	Experimental	139	148	9
	Control	144	147	
2	Experimental	130	133	3
	Control	135	127	
3	Experimental	129	137	8
	Control	134	133	
4	Experimental	133	139	6
	Control	132	139	
5	Experimental	120	162	42
	Control	132	127	
6	Experimental	134	122	12
	Control	134	131	
7	Experimental	135	136	1
	Control	140	132	
9	Experimental	105	104	1
	Control	99	97	
10	Experimental	120	120	0
	Control	121	122	
11	Experimental	121	131	10
	Control	133	137	
12	Experimental	118	126	8
	Control	125	130	
13	Experimental	153	160	7
	Control	162	166	
14	Experimental	143	157	14
	Control	147	157	

The correlation coefficient for the control group pre- and posttest results was quite different from that of the experimental group. The correlation coefficient for the control group was 0.953, indicating that pre- and posttest scores did not vary much. The mean for the pretest was 139.57 while for the posttest it was 142.43 (see Table 13).

TABLE 13
CORRELATION BETWEEN CONTROL GROUP PRE- AND POSTTEST
ITEM TOTALS ON INTERVIEW QUESTIONS 1, 3, 5, 11,
12, 13, 14

Question	Pretest Totals		Posttest Totals
1	144		147
3	134		133
5	132		127
11	133		137
12	125		130
13	162		166
14	147		157

Variable	Mean	Variance	Std. Dev.
Pretest	139.571	153.619	12.394
Posttest	142.429	216.619	14.718

Correlation coefficient = 0.953
.95 correlation indicates no significant change occurred from the pretest to the posttest

Correlation of the experimental group dropped by almost one third compared with the correlation of the control group 0.6 to 0.9.

The correlation of the experimental group dropped by almost one-third as compared with the correlation of the control group.

On the totals of attitude questions 1, 3, 5, 11, 12, 13, and 14, the experimental group's pre- and posttest results showed a correlation of 0.604. The mean for the pretest was 131.86 while that for the posttest was 145.71. The variances for the pre- and posttest conditions were 180.143 and 218.905 respectively (see Table 14), which indicates that some members of the experimental group had changed. The experimental group results showed a wider spread in attitude in the posttest situation than for the pretest.

TABLE 14

CORRELATION BETWEEN EXPERIMENTAL GROUP PRE- AND
 POSTTEST ITEM TOTALS ON INTERVIEW QUESTIONS
 1, 3, 5, 11, 12, 13, 14

Questions	Pretest Totals	Posttest Totals
1	139	148
3	129	137
5	120	162
11	121	130
12	118	116
13	153	160
14	143	157

Variable	Mean	Variance	Std. Dev.
Pretest	131.851	180.143	13.422
Posttest	145.714	218.905	14.795

Correlation coefficient = 0.604

.60 correlation indicates change took place

Variance

180.143] indicates some members of the group changed.
 218.905] There is a wider spread of attitude in the
 posttest than in the pretest.

A correlation matrix was performed on the pre- and posttest results of both groups. Variable 1, the experimental pretest total, and variable 4, the control posttest total, correlate at 0.957, indicating well-matched groups. Variable 2, the experimental posttest total, correlates with variable 4 at 0.515 (see Table 15). The comparison between the experimental group's posttest and the control group's

posttest conditions reveals a change from 0.9 to 0.5 respectively, which provides supporting evidence for the PAPT that the experimental pupils experienced a change in their attitudes.

Therefore, it can be shown from the above correlation data that "attitudes" as measured by these questions were changing in a positive direction for the experimental group.

A "t" test was carried out on questions 1, 3, 5, 11, 12, 13, and 14. For the experimental group the total scores for the pretest and posttest were 931 and 971 respectively. The "t" ratio was 4.262 ($p < .001$), showing a significant increase in attitude score (see Table 10). On the other hand, no significant difference was found between the pre- and posttest conditions of the control group. This supports the claim that a difference of treatment of the two groups caused the discrepancy in the experimental and control group results.

TABLE 15
 CORRELATION OF PRE- AND POSTTEST ITEM TOTALS ON
 INTERVIEW QUESTIONS 1, 3, 5, 11, 12, 13, 14
 OF THE EXPERIMENTAL AND CONTROL GROUPS

Questions	Experimental Group		Control Group	
	Pretest	Posttest	Pretest	Posttest
1	139	148	144	147
3	129	137	134	133
5	120	162	132	127
11	121	130	133	137
12	118	126	125	130
13	153	160	162	166
14	143	157	147	157

Variables	Mean	Variance	Std. Dev.
1. Experimental Pretest	131.857	180.143	13.422
2. Experimental Posttest	145.714	218.905	14.795
3. Control Pretest	139.571	153.619	12.394
4. Control Posttest	142.429	216.619	14.718

Correlation Coefficients for

Experimental Pretest and Experimental Posttest	= 0.604
Experimental Pretest and Control Pretest	= 0.969
Experimental Pretest and Control Posttest	= 0.957
Experimental Posttest and Control Pretest	= 0.664
Experimental Posttest and Control Posttest	= 0.515
Control Pretest and Control Posttest	= 0.953

Correlation Matrix

Variables	1	2	3	4
1	1	0.604	0.969	0.957
2		1	0.664	0.515
3			1	0.953
4				1

3.6 Results and Observations on "Treasure Hunt"

TABLE 16
ENQUIRY GAME PERFORMANCE SCORES

<u>Group</u>	<u>Trial I</u>	<u>Trial II</u>
Experimental	482	651

$$t = 5.60 \quad p < .001$$

Comparison of the performance scores on Trials I and II of "Treasure Hunt" show a very significant improvement in the second experience at playing the game ($t = 5.60$, $p < .001$).⁷⁰ This tends to support the contention that the game increases interest and motivation, resulting in improved performance in the tasks at hand, these being information-retrieval tasks.

An investigation was made of the correlations between the performance scores on "Treasure Hunt" and the results of the various forms of the Attitude Test (PAPT) for both the pre- and posttest situations. No significant correlations were found between the increase in performance scores and the improvement in attitude on the part of the experimental pupils.

3.6.1 Subjective Appraisals of "Treasure Hunt"

Appraisals and comments were forthcoming from three main sources: (a) the pupil participants, (b) the librarian,

⁷⁰ See Appendix N for performance scores of experimental group pupils on Trials I and II of "Treasure Hunt".

(c) the principal, and in a limited way from the grade VI and VII teachers. Feedback came in two basic forms, firstly, verbal and secondly, nonverbal. Verbal feedback from pupil participants took the form of spontaneous comments about the game or answers elicited during the final Attitude Interview. Nonverbal feedback was illustrated via concentrated, diligent work or slowness, disinterest and noncompletion of tasks, facial expressions and body gestures, and by preoccupation or nonpreoccupation with the game tasks. Nonverbal feedback was manifested by the participants and by onlookers from other grades and of all ages watching the game in action.

The experimenter viewed what seemed to be extremely enthusiastic response to the game. For the most part, participants seemed to be working with great concentration, much effort, and as quickly as they could. Reactions from pupils (bystanders as well as participants) ranged from surprise, pleasure and interest at the attractiveness of the physical layout, and at the fact that the author had developed the game herself.

During the playing time of the game itself, comments were overheard such as this one from a grade VII male student, "I love this game!" This student, as it turned out, had a low standardized reading score (reading ability being an important requisite for success at playing the game). Because this student was so highly motivated by the game, a great effort on his part surmounted his reading difficulties, allowed

him to complete many activities including several Problem-Solving Tasks successfully, and helped him achieve the second highest score within his team of six. This provided a great ego-boost for him, and his enthusiasm rendered him most verbal about the game. Other students expressed the desire to play for longer than the one hour allotted period. They complained that once they had just really gotten started into the game, their time had been consumed. The control group subjects, hearing about "Treasure Hunt" from other pupils in the experimental group, kept nagging the experimenter, demanding their turns at playing "Treasure Hunt". Other comments appearing on the final audiotaped Interview regarding "Treasure Hunt" included: "It's a great game!"; "It proved that looking for information is fun!"; "I liked the game a lot!"; "It was fun and interesting. Before this, finding information was not fun, now it is more fun ...!"; "The game is full of suspense because of the pressure of being timed!"; "It is so much fun! I love it! It is a challenge!"; "Getting information is more interesting. I had trouble before and hated it, but now it's fun!"⁷¹

Comments from the staff members were very encouraging. Mrs. Shirley Dempster, the librarian at Gardenview School, stated that the game merited praise, and that credit was forthcoming to the developer. She also remarked that the

⁷¹ Garellek, May 2, 3, 1972.

pupils were "very absorbed and highly motivated" and that she had never seen the grades VI and VII pupils work so hard in their entire careers at school.⁷² The principal, Mr. Melvin, remarked that the "game is motivating, and there were children working hard that had never put out any effort before."⁷³ These comments by the principal and librarian indicate that the game is related to library skills and attitudes. The teachers of the pupils involved in the exercise indicated that they felt pupils were highly motivated, since apparently the pupils continued to discuss the game and their participation in playing it in a highly supportive manner. Teachers reported eagerness and enthusiasm on the part of participants. As a result, the teachers felt that it was worthwhile to allow certain pupils to use class time to participate in what they had come to believe was interesting, challenging, and meaningful activity all at the same time.

Other indicators of the acceptance of the research as valuable was the fact that no parents offered any opposition to the project nor withdrew their children. The children themselves accepted the project as interesting, enjoyable, and worthwhile since there was absolutely no drop-off of participants at all. All seventy-two pupils who began, remained to complete the study. The staff of Gardenvue School offered

⁷² Garellek, May 9, 1972.

⁷³ Ibid.

complete cooperation, although the study spanned a period of over two months, and in spite of the fact that aspects of it interfered somewhat with class schedules.

3.6.2 Informal Observations Made during Play

During Trial I of the game "Treasure Hunt", the first and second fifteen-minute rounds of activity were the most difficult for the pupils to handle. It was during this time that the players were familiarizing themselves with the game, learning the procedures, and at the same time trying to polish up their efficiency and increase their speed in completing tasks. Having learned from the experience of the game "de-bugging" trials, the experimenter moved around among the experimental subjects, assisting each of the thirty-six pupils wherever and whenever guidance was needed. This aid was offered in the form of hints or comments such as: "Try another encyclopedia."; "Use the card catalogue."; "Check the spelling of the clue word that you are looking up in the card catalogue."; "What references or key words does the card suggest that you use?"; "Think of a synonym for this clue word to look for in the catalogue."⁷⁴ These hints, for the most part, acted as spurs to boost the morale of players encountering difficulty, and helped improve their performance regarding speed and efficiency. When the experimenter gave assistance, this resulted in speeding up the activity and

⁷⁴ Garellek, February 17, 1972 and March 7, 1972.

stirring up more interest and competition. Less assistance was given during the second trial of the game.

3.6.3 Observations Regarding Rearranging the Composition of the Groups

For the most part, the rearrangement of the groups after Trial I of "Treasure Hunt" worked smoothly. The purpose for this move was to ensure that no subject played with the same pupils in Trial II as in Trial I. However, as it turned out, one extroverted boy (pupil E), mentioned earlier in the text, asserted a strong influence on one of the other male participants (pupil F) in the Trial II group. Both boys were classmates in the same grade VII, a factor the experimenter did not consider important and did not use to assist in the rearrangement of the groups for Trial II. Pupil E, the extrovert, appeared "disinterested", and displayed a "nonchalant I-don't-care attitude" or, to put it another way, a "nothing-interests-me, nothing-bothers-me" mood. He began round 1 of the game slowly, and was fooling around for whatever reason (perhaps he may have selected a difficult first activity requiring greater effort than he was in the mood to give at that time). As a result, he began to joke with his classmate, male F, a somewhat introverted follower-type (who must apply himself with diligence in order to achieve satisfactory grades in academic endeavours). Pupil F was distracted, lost track of his own activity and, as was noted on May 3,⁷⁵

⁷⁵ Garellek, May 3, 1972.

pupil F's score in Trial II was substantially lower than his score in Trial I (10 as compared with 17). Pupil E's score was lower as well. However, once he had received several free-incentive points and happened to choose easier tasks to work on, his interest soared, and his score reached a respectably high level, though he did not attain as high a score as on Trial I (26 as compared with 31). On Trial I, as it happens, pupil E had no influence on his teammates, probably due to the fact that he was working very diligently, accumulating answers and points for the entire four rounds.⁷⁶

3.7 Observations on the Information-Retrieval

"Performance" Test

Pupils in both the experimental and control groups were required to complete a simple Performance Test composed of one information-retrieval task per child. To determine whether there was any difference between the two groups in (a) the number of items chosen, and (b) the test scores, "t" tests were administered on these results. No significant differences were shown between the two groups either in number of items ($t = 1.231, p > .1$) or performance scores ($t = 0.003, p > .1$).

However, significant differences between the two groups were discovered in the areas of (a) type of items chosen, and (b) precision of items required for particular topics.

⁷⁶ Garellek, May 2 and 3, 1972.

In "type of items" the difference between the experimental and control groups is outlined below. The difference lay in their use of nonencyclopedic references versus encyclopaediae (see Table 17 and Figure 1).

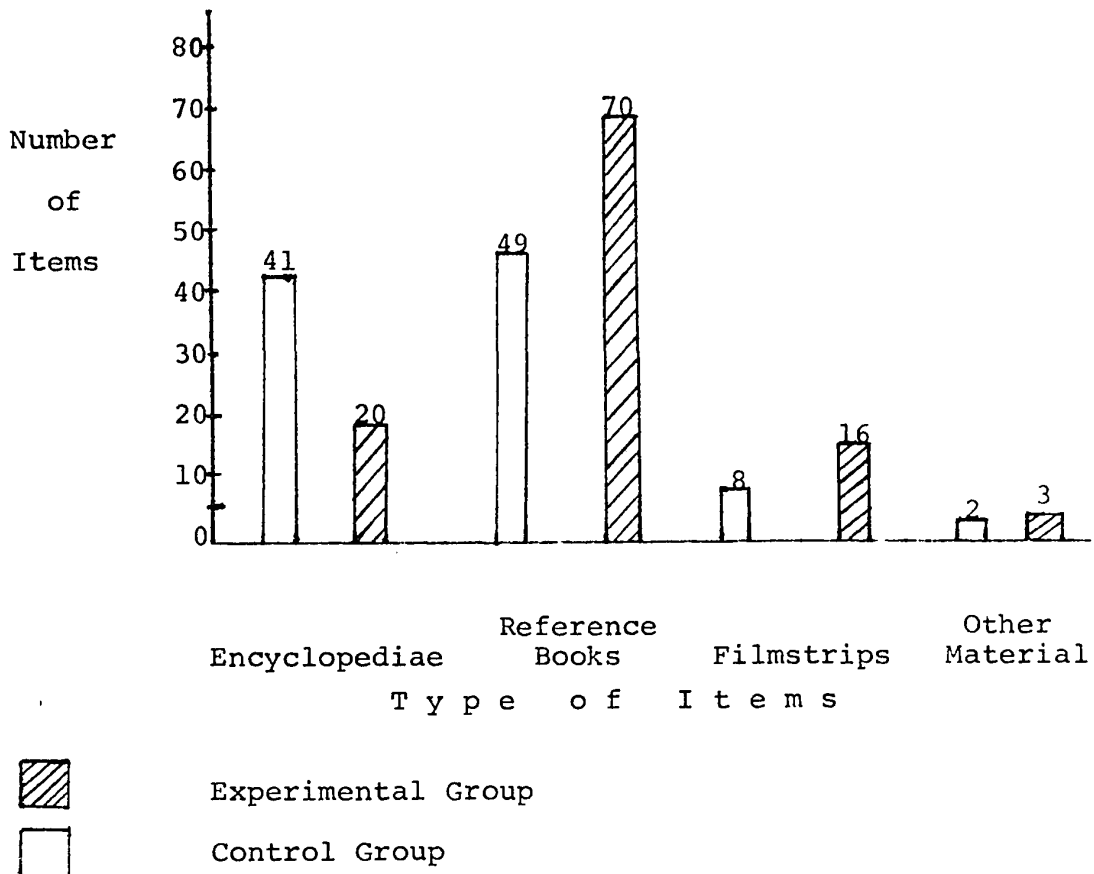
TABLE 17

THE TYPE OF ITEMS SELECTED

Reference	Experimental Group	Control Group
Nonencyclopedic	99	59
Encyclopedic	20	41

Figure 1

PERFORMANCE TEST TYPE OF ITEMS CHOSEN



The experimental pupils, after playing the game, were more than four times as likely to employ reference materials other than encyclopediae as compared with pupils of the control group.

A Chi Square Test shows that there was a very significant difference between experimental pupils and control pupils in their choice of encyclopedic and non-encyclopedic references. Chi Square equals 14.646 ($p < .001$) (see Table 18).

TABLE 18

A CHI SQUARE TABLE OF THE TYPE OF ITEMS SELECTED

Group	Nonencyclopedic	Encyclopedic
Experimental	99	20
Control	59	41

$$\chi^2 = 14.646 \text{ at } 1 \text{ d.f. degrees of freedom}$$

$$p < .001$$

Concerning the precision of items as shown in Tables 19 and 20, experimental pupils chose "excellent" (E) and "very good" (VG) materials 60 times, and "poor" materials (F = fair and U = unsatisfactory) 21 times. In contrast, control pupils chose "excellent" and "very good" materials 38 times, while they selected "poor" materials 19 times. The ratio is 3 to 2 in favor of the experimental group (see Table 20).

TABLE 19
RATING OF PRECISION OF ITEMS CHOSEN BY PUPILS

Group	E	VG	G	F	U	Total Number of Items
Experimental	51	9	28	5	16	109
Control	29	9	43	5	14	100

TABLE 20
QUANTITIES AND PRECISION OF ITEMS CHOSEN

	<u>Rating</u>	<u>Number</u>	<u>Total</u>	
Experimental Group	$\frac{E + VG}{F + U}$	$= \frac{51 + 9}{5 + 16}$	$= \frac{60}{21}$	3
Control Group	$\frac{E + VG}{F + U}$	$= \frac{29 + 9}{5 + 14}$	$= \frac{38}{19}$	2

A Chi Square Test was performed comparing the number of "excellent" and "very good" items chosen versus the "good", "fair", and "unsatisfactory" items. The table below shows that there was a significant difference in the precision of items chosen by the experimental group. The experimental group pupils showed a greater tendency to choose better items ($p > .01 < .02$ [see Table 21]) than the control group subjects.

TABLE 21

A CHI SQUARE TABLE OF THE PRECISION OF ITEMS CHOSEN

<u>Precision of Items</u>	<u>E, VG</u>	<u>G, F, U</u>
Experimental Group	60	47
Control Group	38	62

$$\chi^2 = 6.068$$

p > .01 < .02 at 1 d.f. degree of freedom

3.8 Evidence to Indicate that the Experimental Group and the Control Group are Well Matched

Evidence from various sources and of varying nature indicates that the groups were well matched. Firstly, pupils were chosen at random from the population of three grade VI and two grade VII classes. The control group was composed of eleven grade VII pupils and twenty-five grade VI pupils. The experimental group consisted of fourteen grade VII pupils and twenty-two pupils from the grade VI classes. Sex distribution within the two groups was as follows: the experimental group was comprised of sixteen girls and twenty boys, while the control group had an even spread of eighteen girls and eighteen boys.

The Attitude Test (PAPT) and the Interview results have led this researcher to conclude that the control and experimental groups originated from the same population.

In all but one test no significant difference was shown between the two groups in the pretest situations ($p < .1$). In the one exception the pretest difference was shown at between the .01 and .05 levels.⁷⁷ However, the evidence is weighted in the direction of nonsignificant difference between the two groups.

⁷⁷ See Appendix K3 for pretest Interview results deviating from other pretest data and for results about the similarity of the experimental and control groups.

CHAPTER IV

CONCLUSION

4.1 Principal Conclusion4.1.1 Conclusions Regarding Attitude Change
and its Relation to "Treasure Hunt"

It is concluded that the null hypothesis was rejected, that attitude change did take place on the part of the experimental group, and that this was directly due to the game experiences of the experimental pupils with "Treasure Hunt". This conclusion stems from both direct observation and the Attitude Test (PAPT) results. In particular, there was a significant positive change in attitudes of the experimental group as shown by results of the Paper and Pencil Attitude Test, whereas there was no significant change within the control group. Again the Attitude Interview ratings show that there was a 15% increase in the posttest Interview scores for the experimental group. The control group results on the Interview indicate no significant difference between the pre- and posttest results. Results of the correlation between the scores on Trial II of "Treasure Hunt" and the posttest PAPT attitude ratings were not significant. Pupils' attitudes seemed to be related to the specific incentives and rewards of the game, and not to the overall scores they obtained. If attitudes had been related to scores, in many

cases pupils with low scores would have had a corresponding drop in attitude, would have lost interest and given up.

Observations recorded by the experimenter on May 2, 1972, in her Laboratory Book state that "... the game is motivating ...", "... performance is high ...", and there is "... generally very active participation on the part of the pupils." The librarian noted "... more effort and concentration from certain students than in any of their other endeavours." The school principal stated on the basis of his observations that the game was motivating.⁷⁸

4.1.2 The Game Experience Improved Performance

Investigation of the Performance Test exhibited diverse results. When examining certain results of both the experimental and control groups, there seemed to be no significant difference in terms of total scores and number of items selected. However, the experimental group showed significant superiority in: (a) selecting the best or most precise materials suitable for particular topics; (b) the tendency to choose greater amounts of nonencyclopedic references; and (c) mastery of certain card catalogue skills already outlined in Chapter III. These latter skills were especially stressed aspects of the game, including the selection and notation of correct, concise responses to tasks. Therefore, the fact

⁷⁸ Garellek, May 9, 1972.

that the experimental group did outperform the control group, in some aspects, demonstrates that "Treasure Hunt" did improve performance on those skills which it emphasized.

4.1.3 The Change Agent--Tutoring or the Enquiry Game

In the experimenter's opinion the main agent of change was the game itself. Tutoring was necessary in the first trial of "Treasure Hunt", since this was a new and unfamiliar experience requiring certain skills that many of the pupils lacked or possessed to a lesser degree than was required for success at the game and for the subsequent positive reinforcement success would bring. However, during Trial II of "Treasure Hunt", virtually no assistance or tutoring was provided by the experimenter. Nevertheless, activity continued at a steady, rapid pace with participants demonstrating enthusiasm and diligence in their work. Comments by these pupils, the principal, and the librarian supported the view that the game was the major motivating element of this research study.⁷⁹

4.1.4 The Enquiry Game is a Valuable Learning Tool

Observations, comments, and performance during and after the game trials tend to demonstrate the value of "Treasure Hunt" as an educational device. It has shown that it can sustain motivation and interest over periods of more than one hour in length. As some pupils stated, it turned

⁷⁹ Garellek, February to June, 1972.

a job which used to be considered a chore into a pleasant experience. Motivation sustained slower pupils, not only bright ones, so that they improved their skills as well as providing them with enjoyment and a sense of pride in accomplishment. The game used the element of positive reinforcement with almost no negative aspects, a mark of good pedagogy. When one is allowed to experience success constantly, one tends to want to learn more, to try harder, and to keep on being successful. This aspect is an excellent ego-booster for pupils of lower academic achievement levels, pupils who are introverted and have inferiority complexes. A difference was noted in the way pupils worked between Trials I and II of the game. On the second occasion, pupils showed improvement in their organization and approach to answering the problems, and in using the materials and facilities (specifically the card catalogue). For the main part, most pupils increased their speed and efficiency in their tasks. Finally, as was noted by the librarian, participants applied themselves with more diligent and concentrated effort than she had ever before observed them to produce.

Let us examine its cost-effectiveness. Compared to other media such as filmstrips, films, slides, and audiotapes or videotapes, one or even several board games are cheaper and probably more effective than most of these mentioned.

Each of these other devices need machines or projectors which escalate costs, and for videotape the costs run into thousands of dollars. Maintenance of the software and hardware is also costly, whereas the cost of a board game would probably run substantially less than ten dollars each. The novelty of filmstrips, films, slides, and audiotape wears off, whereas with "Treasure Hunt" or a board game such as "Monopoly", one can maintain interest because of the different permutations and combinations possible. Each time one plays the game, the alternatives and outcomes can be different. To support this latter point, other sets of cards can be devised to replace a set with which pupils are already familiar. For example, two different sets of cards were used in the first and second trials of "Treasure Hunt".

Other media and methods call for passive reception and processing of concepts presented, while "Treasure Hunt" requires learners to participate as they learn, and to practice and reinforce concepts presented to them. Thus, learning is active and in all probability results in better and more retention of data. Learning by doing is more fun than learning by ingestion or passive reception. Therefore, it follows that one is more likely to learn what one enjoys and learn it better.

Other positive factors include: its adaptability to pupils of different age and grade levels, and its suitability for small group work under the supervision of either a pupil

skilled at the game or a paraprofessional teacher-aide, considered very important in present-day education.

4.2 Problems of Attitude Measurement

4.2.1 The Interview and the Attitude Test

After analysis of the responses of the pre- and posttest Attitude Interviews, in the pretest situation the control group and the experimental group exhibited no significant difference in attitude ratings. The Paper and Pencil pretest results also show no significant difference between the two groups.

Unfortunately, posttest Interview ratings also indicate that there was no significant difference in attitude between the control group and the experimental group. These findings contradict the PAPT Attitude Test. It stands to reason that having carried out a Pilot Study and an Item Analysis on this latter test to ensure reliability and validity, it provides more solid ground than the Interview and, as such, merits greater weight than the Interview ratings do. Whereas in all cases the Written Test yields significant improvement in attitude scores ($p < .001$), the inability of the Interview ratings to show any measurable change in attitude indicates that the Interview procedure and rating procedure need further development. Nonsignificant results may have been caused by the manner in which the Interviews were administered, and in the discrepancy in the grading of responses. The experimenter

worked at all times with the experimental group, while her research assistant handled the control group through all phases of the research. It would have been better to have distributed these tasks equally between the experimenter and the assistant.

The pretest Interview ratings show that the research assistant tended to assign marks with greater dispersion. In the posttest Interview, scoring was more similar.

Or perhaps a nonuniform approach had an impact and affected the results. The experimenter emphasized the importance of honesty of responses and how this aspect could distort the findings of the research. Although the questionnaire was structured and the script the same, perhaps responses to prompts and probes were not consistent enough. They were left to the interviewer to structure rather than using the more scientific approach of recording all information for both interviewers to employ uniformly.

In future such Interviews should be set up so that both the author and the research assistant would interview one half of each of the experimental and control groups to ensure uniformity of treatment and administration of the Interviews. The alternative of one person doing all the Interviews was out of the question due to lack of experimental time with the school term coming quickly to a close. However, in the author's view what is important is the difference

between the pretest Interview results and the posttest results, and not the absolute scores (see Table 3, Chapter III).

A time factor may have contributed to the discrepancy between the written Attitude posttest and the posttest Interview. The Attitude Test was administered immediately after the second game trial. At this time the experimental group was still feeling the stimulating effects of their experience of playing "Treasure Hunt" in the library. The Interview was administered between fourteen and nineteen days later. During this interval, the positive effects may have worn off, the pupils may have forgotten how they felt, or may have lost their good feelings toward library use. The experimental treatment may have resulted only in short-term increments in attitude which tended to fade over time.

4.2.2 Second-Order Problems Encountered

Using Interview Ratings

Problems arose concerning the use of the five-point rating scale to objectify a subjective quality, that is "attitudes". One difficulty encountered was how one could determine absolutely whether each rater had the same conception of the value of each score or used the same standards to score any item. Does a score of 5 or 4, and so on, mean the same thing to different people, that is, to the two raters? This is questionable. To combat this inequity, strict

standards or criteria were established for each item in order to secure uniformity of scoring. In addition, another difficulty encountered was the need to determine whether intervals between scores, for example the gap between 5 and 4, 4 and 3, and so on, were uniform. Does a score of 4 mean that one child is half as positive as a child whose score is 5, and so on? Does the interval between ratings have the same or uniform value for different raters? This issue, too, posed a problem. Thirdly, although rating was to be done on a five-point scale, the researcher herself generally used a three-point scale with values ranging from 4 to 2. Rarely did she assign scores of 5 (extremely positive) or 1 (extremely negative); her reasoning being that pupils had to show extreme differences from other subjects to merit these polar scores. On the other hand, her research assistant was much more prone to assigning extreme scores of 5 or 1 to pupils. She made full use of the five-point scale compared with the experimenter.

Nevertheless, this researcher did utilize the Interview although she realized the problems involved. The difficulties included: that of rapport with participants; the possibility of interviewer bias; and the possibility of participants fulfilling the expectations of the interviewer, that is, the "Rosenthal effect". The decision to use the Interview in spite of the above-mentioned problems was taken because of the depth and richness of data that was the hoped-for outcome of the Interview.

4.2.3 Teachers' Estimations of the Attitudes of Pupils

Discrepancies have come to light between the experimenter's and the Gardenview teachers' estimation of pupils' attitudes. This occurrence may have had its roots in differences of opinion as to the definition of the concept "attitudes". Scientists for years have had difficulty in formulating a satisfactory definition. Jahoda and Warren (1966, p. 7) state that "For several decades ... there has been in the literature on attitudes a continuous undercurrent of controversy over both the theoretical and operational definition of the term."⁸⁰ The definition utilized by the author is one adapted from Vernon (1953, p. 144) and found in Nisbet and Entwistle (1970, p. 125). An attitude "... generally implies a personality disposition or drive which determines behaviour towards or opinions and beliefs about ..."⁸¹ use of the library and information retrieval. There is a distinct possibility then that the teachers' estimations of attitudes of the pupils were the result of tacitly assumed concepts of the term which differed from that of the author. Perhaps their concepts were not aimed specifically at pupils' attitudes toward information retrieval,

⁸⁰ Marie Jahoda and Neil Warren, eds., Attitudes: Selected Readings (Middlesex, England: Penguin Books, 1966), p. 7.

⁸¹ P. E. Vernon, Personality Tests and Assessments (London: Methuen, 1953), p. 144, cited by John Donald Nisbet and Noel James Entwistle, Educational Research Methods (London: University of London Press, 1970), p. 125.

but rather were the product of appraisals of the more general attitudes toward school and learning.

It has been determined that pupils received library orientation or instruction neither from the librarian nor from the classroom teacher. Library research projects were rarely assigned. The opportunities for observation of pupils at work in the library performing information-retrieval tasks were minimal. Therefore, it seems plausible that teachers' appraisals of pupils' attitudes toward information retrieval may have been extrapolated from observation of pupils and estimation of their general attitudes toward school, assignments, and/or learning. If this situation had been the actual case, then one would have to say that teachers' appraisals of more specific attitudes toward library use could not be very accurate.

4.3 Conclusions Regarding the Measuring Instruments

4.3.1 The Interview

Because the use of more than one testing instrument is recommended, this researcher is prepared in the future to use validated materials only. Since no validated material was available for the project in the area of attitudes toward library use and information retrieval, further research in the area requires that pilot studies be done on interview questionnaires constructed by the individual researcher himself. The construction and validation of questionnaires

and interviews should follow procedures such as those outlined in Nisbet and Entwistle (1970, pp. 32-53).⁸² Devising and validating a measuring instrument is quite a lengthy procedure. In fact, formulation of such an instrument is really a thesis in itself.

The aim of more precise validation of an interview, in this case, is to make sure that it tests what one intends it to test.

4.3.2 The Interview and the Attitude Test

The inherent danger in tests is the problem that one never knows whether one's test is actually measuring what one wants it to measure. In Nisbet and Entwistle (1970, p. 118) this is termed the "jingle fallacy, the error of assuming that a test measures what its title says it measures."⁸³

Because of the difficulty of designing questionnaires and interviews, this researcher decided to use the results of both, employing the Interview as a cross-check to the Paper and Pencil Attitude Test, as has been previously mentioned. Flexner (1930) in Nisbet and Entwistle (1970, p. 53) is referred to in this statement: "Questionnaires show what people say, not what they do or are. Also, the virtual impossibility of posing a completely neutral question must bias the results." He also strikes at "... the untested validity of the responses."⁸⁴ However, the author agrees

⁸² Nisbet and Entwistle, pp. 32-53.

⁸³ Ibid., p. 118.

⁸⁴ A. Flexner, Universities, American, English, German (London: Oxford University Press, 1930), p. 125, cited by Nisbet and Entwistle, p. 53.

with Nisbet and Entwistle (1970, p. 53) when they state, "[The] ... inherent defects can, however, be minimized by taking great care in designing the questionnaires--checking the wording meticulously, using pilot studies ... [etc.]"⁸⁵ One trial run of the Interview Questionnaire was carried out.* As a result, the questions were revised for the actual research project. Although the Interview was not validated further, the author decided to use the responses as general indications of the state of pupils' attitudes by the manner and tone of voice of the subject in addition to the content of the answers. Together, these factors were expected to reveal how the target pupils actually felt about the library, the librarian, the atmosphere in the library, and toward information-retrieval tasks. Feeling that the library is a comfortable place, feeling welcome there, having warm relations with the librarian and admiring her ability, and not hesitating to ask her for assistance were considered factors which would influence an individual toward or away from using the library for research purposes, and even influence one's attitude toward information retrieval itself.

4.3.3 Cost-Benefit Ratio of the Interview

An investigation into the cost-benefit ratio of the Interview Questionnaire should determine whether or not it is

⁸⁵ Nisbet and Entwistle, p. 53.

* See Chapter III, Section 3, The Attitude Interview.

a worthwhile aspect of the research. It has been established that the Interview Questionnaire was an inadequate instrument to measure the attitudes of pupils toward library use and information retrieval. Interviews were conducted on two occasions for all seventy-two pupils. Each interview lasted ten minutes on the average. A total of 1440 minutes or twenty-four hours were spent in all. Considering the cost of the time spent by the administrator and her assistant or two paraprofessionals at \$3.00 per hour, this would total about \$144.00. Then one must not forget the loss of learning time on the part of pupil participants in regularly scheduled classes. Another consideration is the time taken by the researcher to devise and revise the test: a period of between three to four weeks. All these things taken into account, the Interview shows a low cost-benefit ratio and, therefore, was not the worthwhile instrument that it was hoped to be. Thus, in its present form, the Interview should be eliminated from the procedure of the research, or else further work should be carried out in constructing a better interview.

Use of a well-constructed and well-validated interview, on the contrary, might offset the high cost by the richness and relevancy of data extracted by an improved questionnaire.

4.3.4 The Attitude Test (PAPT)

The PAPT Attitude Test was used in conjunction with the Interview. Nisbet and Entwistle (1970, p. 126) suggest

that it is advisable to use alternate approaches to the measurement of attitude as a check on the validity of the measures.⁸⁶

The Attitude Test statements were short and to the point. They dealt primarily with attitude toward information retrieval and not feelings toward the library in general, nor any other related topic. The Paper and Pencil Test was proven valid as demonstrated by the Pilot Study data found in Chapters II and III.

In order for responses to be accepted as having validity, questions are present in re-worded form to ensure internal consistency. Answers to such questions should match if they are to be judged as useful data. This was done for both the Attitude Test and the Interview.

The researcher also incorporated questions in the Interview similar to the items which appeared in the Attitude Test as a means to check on consistency of pupils' responses.

In the Pilot Study previously mentioned, pupils' ratings of specific statements were highly correlated with teachers' estimations of pupil attitudes (see Chapters II and III, Pilot Study data). Seven statements were selected as valid attitude items. Certain Attitude Interview questions (1, 3, 5, 11, 12, 13, and 14) did show a correlation with the Attitude Test (PAPT) items 1, 2, 3, 5, 7, 9, and 10.

⁸⁶ Nisbet and Entwistle, p. 126.

However, in the posttest situations, the correlation coefficients showed no significant difference between the experimental and control groups.

Other evidence is provided in relating "Treasure Hunt" and the Attitude Test (PAPT). The test measures something, and the game increases whatever it measures. Observations and comments by the principal, Mr. Melvin, and the librarian, Mrs. Dempster, indicated that the game was related to library skills and attitudes. Therefore, the logical next step is to conclude that the test probably measures attitudes toward library use and information retrieval.

The cost-benefit ratio of the Paper and Pencil Attitude Test (PAPT) is high. Although it took approximately three months to devise, revise, and carry out a Pilot Study, the instrument was shown to have high merit. It offered several advantages: (a) administration of the test including instructions used a total of less than twenty minutes of class time; (b) it could be administered to a whole class simultaneously, causing very little disruption of class schedules; (c) one paraprofessional could administer the test to all classes involved or, with cooperation obtained, teachers of all classes participating in the study could administrate the Attitude Test in the same twenty minute period or at any other time they would choose; and (d) the values chosen by pupils on test items represent a more objective outcome and were probably

closer to the true attitudes of the pupil participants than subjective ratings of the Interview evaluations carried out by the experimenter and her assistant. Brevity, ease of administration and completion, the relatively short time needed to administer it, and the fact of its objectiveness all point to the conclusion that the test exhibits a high cost-benefit ratio. This makes it a valuable measuring instrument to be used in the research project.

4.3.5 The Performance Test

The Performance Test has been shown to be valid, and reliability has been proven in the investigation carried on by Kyran Kennedy. In Mr. Kennedy's study, the test was found to be highly reliable.⁸⁷ The test itself is very expensive because of the length of time required to administer it. The amount of time pupils spent on any one retrieval task ranged from between four minutes to twenty-five minutes over a period of seven days (May 25 and 26, June 1, 2, 5, and 6). The reason for the extended period of time required was that only one pupil at a time could be observed and evaluated during the Performance Test using the facilities of the library.

⁸⁷ Kyran Kennedy, "An Experimental Study of an Audio-Tutorial Self Instructional System as an Aid to Pre-Adolescent School Children in Developing a Search Strategy for Locating and Selecting Materials and Information in a Resource Centre" (Unpublished M. A. Thesis, Sir George Williams University, Fall 1972).

The cost of two raters per performance over a seven-day period is high at \$3.00 per hour. Interference with class schedules and pupils' loss of class time also keep the cost of this procedure high. However, it does serve the requirements of the research by keeping track of the exact procedure used by any one pupil to note improvement or change in any direction. A group-administered performance test could be used, but with these results: Pupils could assist each other; more invigilators would be needed; it would be impossible to keep track of the exact procedure each individual had used; and evaluation would only be possible on the end product.

4.3.6 Allocation of Tasks to the Experimenter and to her Assistant

For future experimental work, tasks should be evenly distributed between the researcher and her assistant to offset certain distorted effects mentioned in Chapter III. Both the experimenter and her assistant should work with one half of each of the experimental and control groups in all phases of the research--with the exception of the experimental group game treatment phase--to offset distortion such as that resulting when each administrator works with the same group at all times. Each experimenter is unique and, therefore, each affects different people in different ways; each situation influenced by diverse variables results in distorted outcomes.

4.3.7 Considerations Regarding the Sample Population

The target population for the project was suburban middle-class pupils as had been the case in the RCOLP Project. This present project in a sense was a follow-up study to discern whether there was indeed an attitude component affecting pupils' performances of information-retrieval tasks, and to employ some motivational learning device to improve those attitudes. Since these hypotheses were the result of the previous research with suburban middle-class children, a similar sample population was again chosen as the target population for the present study.

One main finding of the research was that the pupils involved in both the RCOLP study and the present one were woefully lacking in the area of library skills. It has been shown that middle-class pupils include some having difficulty performing information skills, and others who find data-retrieval tasks tedious. If this is the case, then pupils of other socioeconomic levels should be considered for participation in similar research. For example, pupils of lower socioeconomic levels living in slum areas and pupils of different races are often referred to as "disadvantaged" and are depicted as having lower motivation for academic achievement (Backman and Secord, p. 27).⁸⁸ The author therefore, suggests that an interesting motivating program of library

⁸⁸ Backman and Secord, p. 27.

instruction involving the use of tools such as "Treasure Hunt" would be of great value to such pupils. It is much easier to learn something that one enjoys than something one dislikes or to which one is indifferent. Conventional programs in schools located in lower socioeconomic areas have tended to produce in children an attitude of indifference and distaste for learning, more specifically toward library use and data retrieval. This writer is proposing an interesting as well as a motivating alternative approach to reach these pupils.

Because some of the findings were inconclusive, perhaps the sample size of the Gardenview School pupils did not prove sufficient to detect the hoped-for results. A larger sample of senior elementary school pupils from several schools might show better results, as was the case in the Pilot Study whose sample population numbered 284 subjects.

4.3.8 Lasting Effects

Unfortunately there was no opportunity to see whether or not there was any transfer of training other than during the Performance Test. The study was carried out close to the end of the school year, and no further research projects were assigned by class teachers to note any improvement in pupils' work.

It would be interesting to do a follow-up study on these same pupils to see whether any knowledge or skills in information retrieval was retained. Because of the inability

to have pupils play "Treasure Hunt" more than twice, it is probable that part of the new knowledge and ability they gained would be lost. Two experiences in playing "Treasure Hunt", it seems, do not provide pupils with sufficient time to recall, even to learn, and apply library skills effectively (as shown by certain results of the Performance Test), thereby improving performance, nor will they at the same time bring about a true and lasting attitude change toward the library. The conclusions of the research indicate that as many repeated trials as necessary, or as many as students want, will produce the desired effects of changed attitudes and better performance. Fletcher (1971,b, p. 280) states, "It would appear that a substantial increase in their power [the power of games] as teaching devices could be brought about by providing ... for multiple plays ..."⁸⁹ As it turns out, some pupils felt that they learned to retrieve information more quickly and efficiently. Whether they will retain their new skills is questionable if a library program is not continued. However, one-half of the pupils stated that their feelings toward information retrieval remained unchanged; some because they already had positive attitudes, and some who felt two experiences playing the game was not enough.* The other half

⁸⁹ Jerry L. Fletcher, 1971 (b), p. 280.

* This information is taken from the final Attitude Interviews of experimental pupils regarding their opinions as to the value of "Treasure Hunt" (responses to questions 15 to 18).

felt that their attitudes had been changed to some degree. The author agrees with the need for more than two experiences if the game is to effect a true lasting change in pupils' attitudes toward library use. This supports Fletcher's comment above. With further opportunities to play "Treasure Hunt", skills presented should be reinforced and retained, and those same skills would probably be performed with greater ease, speed and efficiency.

Continuing a library skills program and reinforcement of the skills learned would ensure retention and improvement of information-retrieval and research skills. That there is a dearth of good library programs at any level of schooling is a fact. Proof of this situation is the intensive library orientation program instituted at Sir George Williams University for freshmen and other students lacking the required level of skills for information retrieval. Perkins (1970, p. 20) talks about the deplorable lack of library skills and information-retrieval techniques of college students which exists " ... in alarming numbers."⁹⁰ It is easy to see that the blame for this situation lies with the educational system. Library orientation programs must begin in elementary school and continue through high school. And it is evident that library courses based on sound educational

⁹⁰ Ralph Perkins, "Realistic Library Orientation - A Necessity," Library-College Journal, III (Fall 1970), p. 20.

principles are sorely needed, and "must" be instituted to keep up with the latest trends in education of individualized learning and independent study.

4.4 Guide to the Administration of "Treasure Hunt"

The rules for players (Appendix C1) provide a simple, straightforward introduction and orientation to the procedures of the game. Chapter II, Section 3, "Description of the Game", provides a detailed account for the prospective administrator of all aspects of "Treasure Hunt": (a) its objectives; (b) the physical make-up; (c) the contents of the cards used; and (d) information on what pupils are required to do--procedures that the administrator as well as the participants need to know for play to progress. Finally, a tape recording of the experimenter briefing the pupils is available in which the entire procedure is reviewed, and explanations of difficult aspects of the game are included. Copies of all these guides for the prospective conductor can be made available.

Scoring of answers is quite simple. All answers to questions and activities are charted on master answer sheets. The full answers are provided as well as the score which each response merits. Only complete answers are acceptable.

4.4.1 Problems Related to Widespread Implementation

A problem posed by Mr. Melvin, the principal of Gardenview School, regarding motivation seems to the experimenter to be a crucial one. Although the game motivates

children, the problem remains to motivate teachers and librarians to learn to use it. To administer the game properly requires training. However, Mr. Melvin has concluded that " ... if time and effort are required to implement a new device, teachers tend to fall back on old routine methods since they are easier." If there is a " ... lack of knowledge in implementing a new device, there must be a lack of desire." As a result, " ... principals tend to limit the purchase of new materials, since they tend to gather dust and are rarely used."⁹¹

The experimenter agrees that teacher motivation is an important problem. However, since there is a trend toward the use of paraprofessional-aides in schools, these paraprofessionals could be trained to administer the game. The common failing of teachers to avoid the new, the unknown, out of fear or just laziness is a practice this researcher deplores (being herself a teacher). It is her contention that teachers should take updating courses during the evenings or during the summer, or special in-service courses, to learn and put into practice the latest media, methods, and philosophy of education. Teachers who coast along on their past laurels and job security ought to be forced to resign for not doing their best on the job.

⁹¹ Garellek, May 9, 1972.

Another problem related to the aforementioned one becomes apparent. To quote Dr. Gary Boyd, the experimenter "used all her experience and knowledge of teaching techniques" to introduce the game and demonstrate the procedures. She was highly enthusiastic and motivated because of her deep involvement in the project.* The question remains, would others administering the game do the same? The researcher's answer is that conscientious teachers, or teacher-aides wholly involved and interested in facilitating pupil learning, could and would do the same job.

4.4.2 Activities Appropriate for Eleven- and Twelve-Year-Olds

The question arises whether activities of the game "Treasure Hunt" and the tasks of the Performance Test were appropriate for eleven- and twelve-year-old pupils. It is this author's contention that six years of experience in teaching eleven- and twelve-year-olds gives her the support she needs. During her career she gained much knowledge about the level of skills of these pupils, their verbal and reading ability, their ability to perform abstract thinking and problem-solving tasks, and much about their likes and dislikes. Thus, she feels that she has earned the right to consider the tasks involved in the study relevant and appropriate for senior elementary school pupils.

* Orientation and instruction observed and recorded by Dr. Gary Boyd: comments made by Dr. Boyd to the researcher regarding her techniques of administration of the enquiry game.

4.4.3 Personalities and Group Composition

The problem that personalities of the student sample might contaminate the results of the study was considered. An over-abundance of any one personality type, for example introversion-unstable or extroversion-unstable, could interfere with the smooth operation of the game, and results would be biased in favor of the predominant personality type. It was hoped that interviews with teachers and analyses of records would probably suffice and could disclose any such problem, although it was highly unlikely that this phenomenon would occur. However, in one case it seemed a good idea to administer a personality test to discern the personality type of one of the participants, pupil E (previously mentioned), and the experimenter could gear the evaluation of the research accordingly. However, permission for administration of a personality test was refused.

Friction between players could combine with frustration and influence the performance of participants. The atmosphere of the game could become stilted and uncomfortable, whereas a calm, relaxed atmosphere is important for the effectiveness of the research. In order to prevent friction between players within any group of six to contaminate their performance, for the second trial the groups were completely rearranged so that different players competed against each other. Unfortunately, in Trial II the factor of classmates

being in the same group was not taken into consideration, with the result that pupil E influenced his classmate, pupil F, in a negative manner, as previously mentioned. This factor should be considered in the future in the restructuring of new groups.

Another consideration concerning individual personality is whether a participant is a loner or "inner-directed", or whether he is peer-motivated or "other-directed" (Reisman, et al., 1969).⁹² The latter type would be a good gauge by which to determine the effectiveness of "Treasure Hunt" to influence attitudes and performance of library skills, since peer-group influence may be contrary to academic achievement.

Pupil E, already described as peer-influenced as well as a peer-influencer, displayed behaviour during the game trials indicating that he was motivated by the game; but perhaps mainly by the element of competition or by the desire to show others that the game was a "cinch", that he could handle it easily. Evidence to support this is indicated by his high scores of 31 and 26 in Trials I and II respectively.

Although pre-experimental "de-bugging" and revisions were carried out to simplify and achieve smooth operation of "Treasure Hunt", the possibility remains, however, that the activities require further clarification and simplification, and that the wording of instructions on the game cards require

⁹² Reisman et al., pp. 17-32.

simplification as well. Chance Cards especially need revision since pupils began to avoid reading them; they felt that it caused them to lose precious time in each fifteen-minute round during which time they should have been completing activities and accumulating points. Each Chance Card ought to provide some reward or incentive for pupils to read them, such as free points. This is important since the Chance Cards provide the only teaching or information-giving element of the game.

Simplification of the Problem-Solving Activities also appears necessary. Few such activities were completed by the participants. Often they would get discouraged after attempting to complete them, but without success, and showed frustration and puzzlement. Students would make comments such as: "I don't understand what I have to do for this activity!" or "This activity is too difficult and is taking too much time."

Whether library skills are taught or not is largely being left to the discretion of the teacher. Teachers are more involved with covering the content of subjects than with teaching the research or library skills; these are neglected because they are given low priority (Shores and Snoddy, 1971, p. 650).⁹³ Some teachers are strongly motivated by the belief that resource centres and their use are important, and convey this attitude to their youngsters.

⁹³ Shores and Snoddy, p. 650.

Contrary to the researcher's belief that in a school with no library instruction program pupils would exhibit uniformity in their lack of skills, actually pupils started with different degrees of library skills and different attitudes toward the library when they were selected as participants in "Treasure Hunt". Therefore, it seems mandatory, and the librarian, Mrs. Dempster, concurs, that courses in library instruction which are based on sound educational principles should be included in curricula. These courses would use the latest methods and the principle of "learning by doing". An example of this type of course would be the Audio-Tutorial Course (Peterman and Holsclaw, 1971), guiding students through the library while at the same time requiring them to participate in certain tasks.⁹⁴ After this type of library instruction, students would have a more realistic view of the library and an effective set of library skills to be reinforced by playing "Treasure Hunt". Bowers (1971, p. 79) states that "the skills review at Clearlake Oaks is handled mostly through game techniques. This method has proven to be the most enjoyable for the children and produces good results."⁹⁵

⁹⁴ Peterman and Holsclaw, pp. 46-47.

⁹⁵ Melvyn K. Bowers, Library Instruction in the Elementary School (Metuchen, New Jersey: Scarecrow Press, 1971), p. 79.

4.4.4 Where and When the Game is Likely
to be Most Profitable

Children from lower socioeconomic environments such as poverty-stricken children found in "inner-city" schools and children disadvantaged by race and color would derive the most benefit from the game experience. It would be a motivating approach to learning information-retrieval skills and making library use easier and more pleasant. Backman and Secord (p. 27) state, "Much ingenuity is required to interest him [the child] in school activities." Further on they say, "Parents from deprived-area homes are less interested in and less involved in their child's education." And again they state, "The child from an impoverished home has a scanty fund of basic knowledge and insufficiently developed skills for adequate performance ..."⁹⁶

These children lack academic skills even at the beginning of kindergarten or grade I and continue to fall further behind as they grow older. Backman and Secord (1968, p. 25) call it the "cumulative deficit" hypothesis.⁹⁷ As a result, the author supports the view that instruction in library use and information retrieval should begin as early as grade I and deal with concepts at a simple level, gradually increasing the complexity of the material as the

⁹⁶ Backman and Secord, p. 27.

⁹⁷ Ibid., p. 25.

child grows older. This method is borrowed from Jerome Bruner's concept of "spiral learning". His belief is that children of any age can be taught any concept if the teaching is done properly according to the child's level of understanding. The only difference in teaching concepts to children of different ages and maturity is one of complexity and not of kind.⁹⁸

4.4.5 Recommendations for Further Research

The results of the present study indicate that, over a short period of time, attitudes can be enhanced and performance on library tasks improved. However, this experimenter feels that the study needs to be extended beyond the use of the data-retrieval game to include the entire library instruction package being developed by research workers under the aegis of Professor Gary Boyd. The finished product will contain an audio-tutorial providing materials for library orientation, for teaching skills, and for pupils to practise these skills as the learning proceeds. The next aspect is the enquiry game "Treasure Hunt", providing motivation and reinforcing skills presented via the audio-tutorial. Other aspects of the package include the validated Paper and Pencil Attitude Test used in the present research, and the Attitude

⁹⁸ Jerome S. Bruner, "Education as Social Invention," Contemporary Educational Psychology, ed. by Richard M. Jones (New York: Harper and Row, Publishers, 1967), pp. 35-36.

Interview. Further development on the latter instrument is required to eliminate the flaws which have weakened it. It is the author's intention to implement this plan for research in her capacity as a grade VII teacher beginning September, 1972. The procedure will be carried out with four grade VII classes under the course title "Learning Proper Research Techniques". The study will hopefully involve the use of the complete library instruction package (if it is available), and will be carried out over the entire school year. In this way, the author expects to see more lasting effects in terms of attitude improvement and in better skills performance.

4.4.6 Educational Value

We hear time and again about the information explosion of the present technological era. Knowledge is increasing in quantum leaps, making it impossible for any person or even a library to have at their disposal all the information that is available.

According to Shores and Snoddy (1971, p. 648),
" ... with knowledge increasing at a geometrical rate, no child [or even adult] can reasonably aspire to learning more than a fraction of his cultural heritage."⁹⁹ The emphasis in education, therefore, has had to shift from ingesting and storing up facts, to learning the "why" and the "how" of things, that is, "learning how to learn."

⁹⁹ Shores and Snoddy, p. 648.

The trend is toward individualizing learning. Education has become project-oriented once again, but this time the projects are geared for independent work. This is so, in order to maximize individualization in education for the goal of producing capable, effective students who will later take their place in the professional, academic, or commercial areas of society and handle their problems with great skill and ease.

4.4.7 Value as a Thesis Project

As a teacher with ten years of experience in elementary school and in her career as an undergraduate as well as a graduate student, this writer has seen and experienced the inefficiency of libraries. The deplorable nature of the old conventional method of library instruction (Hackman, 1971, p. 300)¹⁰⁰ along with the complete separation of the library program from the rest of the school curriculum is a well-established fact of the past and even of today in some cases.

It has taken many years for educators to realize that skills essential to success in various endeavours, whether they be academic, commercial, or professional, require research and information-retrieval skills, considered for so long an insignificant part of the school curriculum.

¹⁰⁰ Martha Hackman, "Proposal for a Program of Library Instruction," Drexel Library Quarterly, VII (July-October 1971), p. 300.

An area that remains neglected is the area of the effect of students' attitudes on their performance of library skills already learned. "Treasure Hunt" attempts to fill this educational gap in trying to deal with this problem. It is an educational tool which provides not only the opportunity to practise information-retrieval skills, but also motivates participants to practise these skills. It seems also to have the potential to change students' attitudes toward library use in a more positive direction so that it generates improved performance on retrieval tasks.

The ability of the game to fulfill these needs makes it a feasible educational tool for practising, and thereby reinforcing, what has been learned. In this manner, students will acquire a proficiency and have at their fingertips the research skills which can be applied to projects and assignments in any area of the curriculum, skills which so many students, and adults lack, thus hindering their efficiency in their occupations and other endeavours.

APPENDIX A

RESEARCH TIMETABLE

Dates	Experimental Group	Control Group
April 8, 9, 25 8, 9	1. Attitude Interview 2. Attitude Test (PAPT) 3. "Treasure Hunt" Trial I	1. Attitude Interview 2. Attitude Test (PAPT) 3. Game "Careers" Trial I

INTERVAL OF ONE WEEK

May 3, 8, 9 8, 9	1. "Treasure Hunt" Trial II 2. Attitude Test (PAPT)	Game "Monopoly" Trial II
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INTERVAL OF ONE MONTH

May 25, 26, 31 and June 1, 2, 5, 6	1. Attitude Interview 2. Library Skills Performance Test	1. Attitude Interview 2. Library Skills Performance Test
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APPENDIX B1

GAME CARDS

EXAMPLES OF INSCRIPTIONS ON BACK OF
ORANGE ACTIVITY CARDS

Example No. 1

11.

Name this place.Use these clues to find the answer:

- (a) located in North America--45° north latitude and 73° west longitude;
- (b) founded in 1642 by Paul de Chomedey.

Guide:

- 1. Use key words such as names of places, location of place, people, dates.
- 2. Books to use: (a) Atlas of the World or North America; (b) Biographical reference under Chomedey, Paul de.

2 points for correct answer.

Example No. 2

25.

Who am I?Use these clues to find the answer:

- (a) most famous American football player (played halfback position);
- (b) played over 50 years ago;
- (c) scored 224 points in his senior year at Carlisle Institute (college).

Guide:

- 1. Use biographies, biographical encyclopedias, and other books about sports stars or famous American people.
- 2. See sports sections of reference books--football stars.

3 points for correct answer.

Example No. 3

57.

Who am I?Use these clues to find the answer:

- (a) Canadian inventor who lived in Nova Scotia (born 1847 and died 1922);
- (b) invented the woman's favorite "communication device."

Guide:

1. See biographies, biographical references, Canadian Inventors, Great People of Canada, etc.
2. See inventor living in Nova Scotia.
3. See inventor of communication device.
4. For the meaning of words "communication" and "device" use a dictionary.

2 points for correct answer.

Example No. 4

II. 4)

What am I?Use these clues to find the answer:

- (a) I am a sea-fish that looks like a chessman;
- (b) I am very small, and I swim in a vertical position;
- (c) my scientific name is Hippocampus.

Guide:

1. Use books on marine animals, or marine life; sections of books about animals; science encyclopedias. See also books or other materials on Marine Biology. See the animal or zoology or marine animal sections of general encyclopedias.
2. Look in science or zoology or biology books at the index under "hippocampus."
3. Look also at pictures of marine life to find the answer.

3 points for correct answer.

Example No. 5

II. 8)

What am I?Use these clues to find the answer:

- (a) I am a marine animal that looks like a flower and remains attached to one spot.
- (b) I belong to a group of animals named COELENTERATA, ANTHOZOA.
- (c) I have many arms, and when I am irritated, I send out long threads that have stinging cells which can kill small animals.

Guide:

- 1. Use science books about animals (zoology books) or biology books, or animal sections of encyclopedias.
 - 2. Use index or look under marine animals-- COELENTERATA, ANTHOZOA.
 - 3. See also books on Sea Animals, Marine Biology, or Marine Animals.
- 4 points for correct answer.

Example No. 6

II. 11)

Name this place.Use these clues to find the answer:

- (a) A large island in the Arctic Ocean which was discovered in 1615 and belongs to Canada;
- (b) bordered by the Davis Strait on the east, the Hudson Strait on the southeast, and located north of Hudson Bay;
- (c) the capital is Pangnirtung.

Guide:

- 1. Use names as key words--names of places, names which indicate location, etc.
- 2. Use World Atlas or Atlas of North America-- find map of the northern part of Canada, especially the Arctic.

Use the names (key words) to look up in the index of the Atlas and locate the places on the map.

3 points for correct answer.

Example No. 7

II. 19)

Who am I?

Use these clues to find the answer.

- (a) I was a Mongol conqueror, master of the Mongol and Tatar tribes;
- (b) I lived from 1162 to 1227 A.D.;
- (c) In 1215 I conquered parts of China, Turkey, India, Persia, and Russia.

Guide:

1. See geographical references--Great Warriors of the World.
2. Use general encyclopedias under Mongol Tribe and Tatar Tribe, great leader and conqueror, 1162 to 1227.

3 points for correct answer.

APPENDIX B2

EXAMPLES OF INSCRIPTIONS ON BACK OF
PINK QUESTION CARDSExample No. 1

II. 5)

What is glass made of?

Clue: Look up "glass" in science books, chemistry books, or in encyclopedias to find out what it is composed of (what the ingredients are).

2 points for correct answer.

Example No. 2

II. 24)

What is the meaning of the rings which form the symbol of the Olympic Games?



Clue: See sports encyclopedias or sports books or encyclopedias under "Olympic Games - Symbol".

3 points for correct answer.

Example No. 3

II. 28)

How did basketball (as an indoor sport) begin in the United States?

Clue: Use sports books or encyclopedias which are American. Look up "Basketball--How it began in the U.S."

3 points for correct answer.

Example No. 4

II. 35)

In what country were oranges first grown?

Clue: Use encyclopedia under "orange."

2 points for correct answer.

Example No. 5

II. 37)

Are elephants "herbivorous" or "carnivorous?"

Clue: Look up "herbivorous" and "carnivorous" in the dictionary. Then look up information on elephants to find out what they eat.

2 points for correct answer.

APPENDIX B3

EXAMPLES OF INSCRIPTIONS ON BACK OF
BLUE CHANCE CARDS

Example No. 1READ CAREFULLY

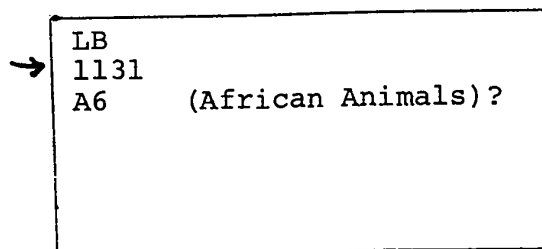
This is a Clue Card. Keep it until you
need to use it.

1. Use Canadian reference books, Canadiana Encyclopedia, for any events, or persons, or places that are Canadian.
2. For American information use American reference books, and World Book or other American encyclopedias.
3. For British (English, Irish, Scottish or Welsh) information use British references and Encyclopedia Britannica.

REPLACE CARD UNDER CHANCE DECK WHEN NO LONGER
NEEDED.

Example No. 2READ CAREFULLY

When looking for a subject in the card catalogue, and you find one or more references to get, copy down the call number, that is, the number (usually on the upper left-hand corner) on the card which tells you where the book is located in the library.



REPLACE CARD AT BOTTOM OF CHANCE DECK.

Example No. 3READ CAREFULLYHow to select books.

1. Ask yourself what subject you are dealing with. "What do I need to find out?"
2. Use the card catalogue to locate materials dealing with the topic (all materials).
3. Follow cross references, for example the "see also" references. Look up "dogs": the cross reference might be "see also - CANINES" or "ANIMALS," "PETS," etc.
4. Don't overlook any book on the subject.
5. Write call numbers, titles, and authors of all books you want.
6. Go to shelves and select those references.

Example No. 4READ CAREFULLYUse different reference material.

1. Biographical encyclopedias, biographical dictionary, Who's Who, biographies (stories of people's lives) and other books or materials of this kind tell about important people down through the ages and what they are famous for.
2. History books or historical stories tell about people and events of the past.

REPLACE UNDER THE CHANCE DECK.

Example No. 5READ CAREFULLY

If you find several books on the same topic, GLANCE through ALL of them to help you decide which are the BEST references for your needs. LOOK ESPECIALLY AT TABLES OF CONTENTS AND INDEXES to find out whether any book contains information which you can use or not.

REPLACE UNDER CHANCE DECK.

Example No. 6READ CAREFULLY

1. Use synonyms (words that have the same meaning or similar meanings as key words given on cards).
2. Try to think of synonyms or replacement words to look up in the card catalogue. (Example: poodle--other words to look up include: animals, dogs, canines, pets.)
3. If you can't think of any other words to look for instead of key words--use a Thesaurus, a Dictionary of Synonyms and Antonyms, or a dictionary.
4. Sometimes the card catalogue provides you with other words to use (e.g. poodle-- See also "dogs," "animals," "canines").

REPLACE UNDER CHANCE DECK.

Example No. 7READ CAREFULLY

This is a Clue Card. Keep it until you need to use it.

Look up in a DICTIONARY, or a THESAURUS, any words in an Activity Card, a Question Card or even a Clue Card that you do not understand. It will save you much time and confusion.

(If you don't know what a Thesaurus is, ask the Librarian or look up the word in a dictionary.)

REPLACE UNDER CHANCE DECK.

Example No. 8

This is a joker card. Keep it until you wish to use it. It will count as one extra point for any activity you happen to be doing. Take one sticker off and give it to the scorekeeper. Each sticker is worth one point.

REPLACE CAREFULLY UNDER CHANCE DECK.

Example No. 9READ CAREFULLY

This is a Clue Card.

Use different resources. Your school may have (in the library) such things as:

1. filmstrips
2. a picture file
3. pamphlets (Vertical File)
4. film loops
5. tape recorders and cassettes
6. magazines
7. newspapers
8. jackdaws
9. kits

which may be of use in helping you find information about certain subjects or helping you find answers or solutions to some problems.

REPLACE CARD UNDER CHANCE DECK.

Example No. 10READ CAREFULLY

This is a Clue Card for the "How to do or make something" Activity Cards. Keep it until you need to use it.

1. "Do it yourself" type of books or books of instruction such as cookbooks, sewing books, books on making, building or inventing things--related to the particular task on the Activity Card should be useful.
2. Think about your problem:
 - (a) What do I have to do or solve?
 - (b) How will I or can I do it?
 - (c) What materials do I need?

Find the answers to these questions, and the problem will be solved.

REPLACE UNDER CHANCE DECK AFTER FINISHED WITH IT.

C. 1 - Yellow Clue Card 3: Bird House

Fine! You have picked the style (the design) and size house you want to build.

Clue 3:

The next step is to find information on how to construct the house, the carpentry or woodwork involved and the instructions or the plans. (Books on hobbies, building things)

Take one sticker 3 (number 1). Find Clue Card 4 (number 1).

$\frac{3}{1} \quad \frac{3}{1} \quad \frac{3}{1} \quad \frac{3}{1} \quad \frac{3}{1} \quad \frac{3}{1} \quad \frac{3}{1} \quad \frac{3}{1} \quad \frac{3}{1} \quad \frac{3}{1}$

D. 1 - Yellow Clue Card 4: Bird House

Nice work. You have your plans and instructions. Now all you need are the tools and the materials, and the house is built.

Now make sure you have taken one sticker from each Clue Card numbered 2, 3, and 4 to bring back to the game. Each sticker is worth one point.

Also make sure you have written the answers to each part of the problem.

$\frac{4}{1} \quad \frac{4}{1} \quad \frac{4}{1} \quad \frac{4}{1} \quad \frac{4}{1} \quad \frac{4}{1} \quad \frac{4}{1} \quad \frac{4}{1} \quad \frac{4}{1} \quad \frac{4}{1}$

Example No. 2A. Orange Activity Card No. 3

How can you make a magnet?

Clue 1:

Look up the meaning of "magnet" and "magnetization". What is a magnet?

Find all books on Magnets, How to do Science Experiments (making magnets), other science books and science encyclopedias. Look under Magnets, Magnetization, How to Make a Magnet.

Find yellow Clue Card 2 (number 3). Take one sticker from each Clue Card you find!

B. 3 - Yellow Clue Card 2: Magnet

Fine. You know what a magnet is and what magnetization is.

Clue 2:

Now you need to find out

- (a) which materials can be made into magnets, and
 (b) how you can make a magnet with these materials.

Use all the books on Magnets and How to do Experiments in Science, etc. The information may be found in the same book you already used. If not, check through the other material.

Take one sticker 2 (number 3). Find Clue Card 3 (number 3).

$\frac{2}{3}$ $\frac{2}{3}$ $\frac{2}{3}$ $\frac{2}{3}$ $\frac{2}{3}$ $\frac{2}{3}$ $\frac{2}{3}$ $\frac{2}{3}$ $\frac{2}{3}$ $\frac{2}{3}$

C. 3 - Yellow Clue Card 3: Magnet

Nice work. You now know how to magnetize certain materials. Some materials can't be made into magnets.

Now, make sure you have taken one sticker from each Clue Card numbered 2 and 3 to take back to the game. Each sticker is worth one point.

Also make sure you have written the answers to each part of the problem.

$\frac{3}{3}$ $\frac{3}{3}$ $\frac{3}{3}$ $\frac{3}{3}$ $\frac{3}{3}$ $\frac{3}{3}$ $\frac{3}{3}$ $\frac{3}{3}$ $\frac{3}{3}$ $\frac{3}{3}$

Example No. 3A. Orange Activity Card No. II A

How was the car (automobile) invented?

Clue 1:

What vehicles or means of transportation existed before the car and led to the invention of the car?

See books on Transportation, The History of Transportation, books about cars, important inventions, How Things Change, etc. Select as many references as you can which deal with the subject.

Find Clue Card 2 (A). Take one sticker from each Clue Card you find.

B. II A - Yellow Clue Card 2: Cars

Good! Now you know how people traveled before the invention of the car and which vehicle led to the invention of the car.

Clue 2:

Now you have to find out about the invention of something which really brought about the creation of the automobile. Something which replaced the horse.

Use the books about the invention of cars, the history of cars, important inventions, and other references you have already selected.

Take one sticker 2 (A). Find yellow Clue Card 3 (A).

$\frac{2}{A}$ $\frac{2}{A}$ $\frac{2}{A}$ $\frac{2}{A}$ $\frac{2}{A}$ $\frac{2}{A}$ $\frac{2}{A}$ $\frac{2}{A}$ $\frac{2}{A}$ $\frac{2}{A}$

C. II A - Yellow Clue Card 3: Cars

Fine! The invention of a particular kind of motor helped develop the car industry.

Now make sure you have taken one sticker from each Clue Card numbered 2 and 3 to bring back to the game. Each sticker is worth one point.

Also make sure you have written the answers to each part of the problem.

$\frac{3}{A}$ $\frac{3}{A}$ $\frac{3}{A}$ $\frac{3}{A}$ $\frac{3}{A}$ $\frac{3}{A}$ $\frac{3}{A}$ $\frac{3}{A}$ $\frac{3}{A}$ $\frac{3}{A}$

Example No. 4

A. Orange Activity Card No. II B

How can you build or start a coin collection?

FORMS PERTAINING TO THE GAME "TREASURE HUNT"

APPENDIX C1

RULES FOR PLAYERS

1. This game is similar to "Monopoly".
2. Six (6) players can play at one time.
3. The board has three types of squares with three decks of cards to go with each type of square--orange Activity Cards, pink Question Cards, and blue Chance Cards.
4. All players toss the dice to determine who is first, second, and so on until the sixth position is decided.
5. There is a fifteen (15) minute time limit for all players on any round of activities. All players must return at once when the buzzer sounds.
6. All players take their turns in order by tossing the dice, moving their pieces to the correct square, and choose cards from the correct deck.
7. Answers to activities or questions must be written on the answer sheet along with your names and activity or question number. Answers and stickers must be given to the scorekeeper who records the points.
8. Among the orange Activity Cards are Problem-Solving Tasks. For the activity players must follow instructions on the cards and trace the information to references which contain yellow Clue Cards and the answers to the problems. Orange Card 1 leads to yellow Clue Card 2 which leads to yellow Clue Card 3, and so on.
9. If a player completes a task before the time limit is up, he may begin a new task and try to complete it as well.
10. The winner is the player who has the most points from correct answers and stickers.

APPENDIX C2

SAMPLE ANSWER SHEET FOR "TREASURE HUNT"

Activity Card Number

Question Card Number

NAME _____

My answer is: _____

My answer is: _____

FORMS PERTAINING TO THE ATTITUDE INTERVIEW

APPENDIX D1

ATTITUDE INTERVIEW

1. How do you feel about going to the school library?
ELICIT COMMENTS.
2. Do you go to the school library because your friends go there or do you usually go on your own?
ELICIT COMMENTS.
3. Do you go to the school library only because someone sends you? (Errands? Punishment?)
ELICIT COMMENTS.
4. Do you come to use the school library because you want to?
ELICIT COMMENTS.
5. (a) Do you use the school library for getting information for projects or assignments?
(b) Do you enjoy looking for information for projects in the library?
ELICIT COMMENTS.
6. Do you use the school library for reading for enjoyment? Do you enjoy doing this in the library?
ELICIT COMMENTS.
7. Would you rather work on projects using your own or class books and materials than do the work in the school library?
ELICIT COMMENTS.
8. Do you feel that you know how to use these things in the library: (a) card catalogue, (b) encyclopedias, (c) vertical file (pamphlets), (d) almanacs, (e) atlases, (f) magazines, (g) Jackdaws, etc.?
ELICIT COMMENTS.
9. Do you know how to choose the best information for your assignments; e.g. if you found three books about the same subject, how would you know which one was the best for you to use?
ELICIT COMMENTS.

10. In your opinion, do the pupils of this school need to be taught how to find information in the library for research projects?
ELICIT COMMENTS.
11. How important is it for pupils to know how to get information properly from the library?
ELICIT COMMENTS.
12. How much spare time do you spend in the library for (a) study purposes, (b) reading for enjoyment, (c) getting information?
ELICIT COMMENTS
13. When you use the school library, is the information you need often available or is it often unavailable? How does that make you feel?
ELICIT COMMENTS.
14. (a) How do you feel toward the librarian and her helpers?
(b) How do you feel about asking them for help? (cooperative, pleasant, helpful?)
ELICIT COMMENTS.

For Experimental Group only*

15. What do you think about the game "Treasure Hunt?" (useful, enjoyable, worthwhile?)
16. Did you feel that you gained anything by playing the game? If yes, explain.
17. Do you feel that playing the game helped you find and use information better? Explain.
18. Do you think that playing the game changed your feelings toward getting information from the library? If yes, how? What do you feel?

*Questions numbered 15 to 18 were used only for the experimental group in the posttest situation in order to receive feedback about the enquiry game.

APPENDIX D2

RATING SCALE FOR RCOLP INTERVIEW QUESTIONS

Name _____ Group _____

1.	5	4	3	2	1
	very positive	positive	1. unsure 2. sometimes yes, sometimes no 3. don't know	negative	very negative
2.	_____	_____	_____	_____	_____
3.	_____	_____	_____	_____	_____
4.	_____	_____	_____	_____	_____
5.	_____	_____	_____	_____	_____
6.	_____	_____	_____	_____	_____
7.	_____	_____	_____	_____	_____
8.	see below				
9.	_____	_____	_____	_____	_____
10.	_____	_____	_____	_____	_____
11.	_____	_____	_____	_____	_____
12.	_____	_____	_____	_____	_____
13.	_____	_____	_____	_____	_____
14.	_____	_____	_____	_____	_____
15.	_____	_____	_____	_____	_____
16.	_____	_____	_____	_____	_____
17.	_____	_____	_____	_____	_____
18.	_____	_____	_____	_____	_____

8. ✓ = yes,; x = no
 card catalogue ___; encyclopedias ___; almanacs ___;
 vertical file ___; atlases ___; magazines ___;
 jackdaws ___.

APPENDIX E1

FORMS PERTAINING TO THE PAPER AND PENCILATTITUDE TEST (PAPT)

INSTRUCTIONS FOR PAPER AND PENCIL ATTITUDE TEST

You have been given a form on which are written a number of statements about the library. Tell whether you agree or disagree with each statement by placing a checkmark (✓) on the blank above the answer which shows how much you agree with the statement.

Example Statement: I like movies.

very true of me	usually true of me	don't know	usually untrue of me	very untrue of me
--------------------	-----------------------	---------------	-------------------------	----------------------

If you think that this statement really tells how you feel, then you would place a checkmark above "very true of me":

✓

 very true of me

(Teacher or administrator demonstrates on an overhead projector or on the chalkboard.) If you think that this statement is the complete opposite of how you feel about movies, then place a checkmark above "very untrue of me":

✓

 very untrue of me

If the statement usually applies to you, then place a checkmark above "usually true of me":

✓

 usually true of me

If you are not sure of your feelings about the statement, then place a checkmark above "don't know":

✓

 don't know

APPENDIX E2

PAPER AND PENCIL ATTITUDE TEST (PAPT)

Name _____ Date _____

1. I ENJOY LOOKING FOR INFORMATION IN THE SCHOOL LIBRARY.

_____	_____	_____	_____	_____
very true of me	usually true of me	don't know	usually untrue of me	very untrue of me

2. I BELIEVE USE OF THE LIBRARY IMPROVES ASSIGNMENTS OR PROJECTS.

_____	_____	_____	_____	_____
very true of me	usually true of me	don't know	usually untrue of me	very untrue of me

3. I FEEL LOST WHEN TRYING TO FIND SOMETHING IN THE SCHOOL LIBRARY.

_____	_____	_____	_____	_____
very true of me	usually true of me	don't know	usually untrue of me	very untrue of me

4. USING THE LIBRARY IS A WASTE OF TIME.

_____	_____	_____	_____	_____
very true of me	usually true of me	don't know	usually untrue of me	very untrue of me

5. THE SCHOOL LIBRARY IS VERY HELPFUL WHEN I HAVE TO DO ASSIGNMENTS.

_____	_____	_____	_____	_____
very true of me	usually true of me	don't know	usually untrue of me	very untrue of me

6. I PREFER TO USE MY OWN OR CLASS BOOKS RATHER THAN THE MATERIALS IN THE LIBRARY.

_____	_____	_____	_____	_____
very true of me	usually true of me	don't know	usually untrue of me	very untrue of me

7. I DON'T LIKE FINDING INFORMATION ON MY OWN IN THE LIBRARY.

_____	_____	_____	_____	_____
very true of me	usually true of me	don't know	usually untrue of me	very untrue of me

8. I USE THE LIBRARY ONLY WHEN I REALLY HAVE TO.

_____	_____	_____	_____	_____
very true of me	usually true of me	don't know	usually untrue of me	very untrue of me

9. MORE PUPILS SHOULD USE THE LIBRARY FOR ASSIGNMENTS.

_____	_____	_____	_____	_____
very true of me	usually true of me	don't know	usually untrue of me	very untrue of me

10. I COULD DO MY WORK JUST AS WELL WITHOUT THE LIBRARY.

_____	_____	_____	_____	_____
very true of me	usually true of me	don't know	usually untrue of me	very untrue of me

11. I WISH I COULD USE THE LIBRARY BETTER.

_____	_____	_____	_____	_____
very true of me	usually true of me	don't know	usually untrue of me	very untrue of me

12. IT IS VERY IMPORTANT TO KNOW HOW TO GET INFORMATION FROM THE LIBRARY.

_____	_____	_____	_____	_____
very true of me	usually true of me	don't know	usually untrue of me	very untrue of me

APPENDIX F1

THE PILOT STUDY CORRELATION BETWEEN PAPT ITEMS AND TEACHERS' APPRAISALS OF PUPIL ATTITUDES (N = 191 SS)

Teacher Appraisal	I t e m s									
	1	2	3	5	7	9	10			
1	.51 p<.001	.64 p<.001	.53 p<.001	.57 p<.001	.59 p<.001	.54 p<.001	.50 p<.001			
Items	1	.73 p<.001	.58 p<.001	.70 p<.001	.66 p<.001	.73 p<.001	.57 p<.001			
2		1	.64 p<.001	.77 p<.001	.71 p<.001	.79 p<.001	.69 p<.001			
3			1	.61 p<.001	.71 p<.001	.61 p<.001	.46 p<.001			
5				1	.71 p<.001	.73 p<.001	.64 p<.001			
7					1	.70 p<.001	.61 p<.001			
9						1	.69 p<.001			
10							1			

APPENDIX F3

A CORRELATION MATRIX OF ATTITUDE TEST (PAPT) ITEMS (1,2,3,5,7,9,10)
AND 13 ATTITUDE INTERVIEW QUESTIONS (1-7, 9-14)
FOR 72 PUPILS OF GARDENVIEW SCHOOL

Questions	1	2	3	4	5	6	7	9	10	11	12	13	14
P	.54 p<.001	.49 p<.001	.13 p>.1	.50 p<.001	.59 p<.001	.32 p.004	.32 p.004	0	0	.41 p<.001	.25 p.019	.11 p>.1	.09 p>.1
A		.30 p.006	0	.25 p.019	.22 p>.05	.01 p>.1	.24 p.021	0	-.17 p>.1	.25 p.019	0	0	0
P			.17 p.075	.10 p.211	0	.11 p>.1	0	.38 p<.001	-.20 p>.1	.11 p>.1	0	0	0
T													
I													
T	.34 p<.003	.45 p<.001	.16 p>.1	.37 p.001	.38 p<.001	.10 p.193	.44 p<.001	0	0	.48 p<.001	.15 p>.1	0	0
E													
M	.16 p>.1	.30 p.005	.18 p>.1	.21 p.040	.34 p<.005	.23 p<.05	0	0	.04 p>.1	.23 p<.04	0	.15 p>.1	.11 p>.1
S													
	.25 p.018	.49 p<.001	0	.13 p.136	.15 p>.1	.38 p<.001	.31 p.005	-.10 p.193	0	.24 p.021	.15 p>.1	0	.19 p>.1
	.23 p<.05	.28 p.009	.24 p<.02	.24 p.021	.14 p>.1	-.10 p.193	.34 p>.005	.13 p>.1	0	.27 p<.02	.31 p<.005	0	.12 p>.1

APPENDIX F2

A CORRELATION MATRIX OF 13 INTERVIEW QUESTIONS (11-7, 9-14)
FOR 72 PUPILS OF GARDENVIEW SCHOOL

Questions	1	2	3	4	5	6	7	9	10	11	12	13	14
1	1	.32 p.004	.25 p.019	.56 p<.001	.32 p<.005	.45 p<.001	.30 p.006	.14 p.118	-.14 p.124	.41 p<.001	.33 p<.003	.21 p.037	.39 p<.001
2		1	.59 p<.001	.29 p.008	.38 p<.001	.38 p<.001	.30 p.006	.25 p.017	-.30 p.006	.32 p.004	.28 p.01	-.04 p.377	.20 p.047
3			1	.46 p<.001	.42 p<.001	.47 p<.001	.32 p.003	.15 p.112	-.06 p.312	.43 p<.001	.38 p<.001	0	0
4				1	.41 p<.001	.37 p.001	.29 p.007	.23 p.026	-.12 p.161	.42 p<.001	.30 p.006	-.01 p.458]	.31 p.004
5					1	.36 p.002	.10 p.193	.05 p.331	-.09 p.233	.41 p<.001	.021 p.021	0	.38 p<.001
6						1	.19 p>.1	-.17 p>.1	0	.45 p<.001	.22 p.031	-.05 p.348	.32 p.003
7							1	0	.04 p.360	.08 p.253	.24 p.021	.09 p.232	.40 p<.001
9								1	0	.25 p.019	.07 p.274	-.04 p.384	.18 p.063
10									1	-.16 p.090	.02 p.449	.21 p.037	-.08 p.242
11										1	.22 p<.04	.11 p>.1	0
12											1	0	.18 p>.1
13												1	.30 p.006
14													1

APPENDIX G

TRANSCRIPTION OF TAPERECORDING OF BRIEFING ON
"TREASURE HUNT"

Gardenview School, June 7, 1972
Resource Centre Oriented Learning Project
Mrs. Yetta Garellek's Game "Treasure Hunt"
The Resource Centre at Gardenview School

Pink cards are Question Cards, orange cards are Activity Cards, and blue cards are Chance Cards.

There are two sections on the answer sheets provided, one on the left side is the activity answer section and on the right side is the section for answers to Question Cards. And there's a space for whatever number of Activity Card you picked up. This one happens to be number 13 and so on. It's very important that you put the number in the proper place. If it's an Activity Card, the number should go in the Activity Card number's place. If it's a pink Question Card, the number of that question should go in its proper place. Your name should always go on every answer sheet. Your answers should be written in note form and be as short as possible. Since you are under a time limit, get things done as quickly as possible but as well as possible. Let's say you pick up an Activity Card of the problem-solving type which requires a longer procedure. If your answer is longer than the space provided, use the rest of the answer sheet. It doesn't matter. You can even write on the back of the sheet. I will know what it is because you have put the number in

the correct place.

There are approximately four rounds of activities or tasks. Everybody starts and finishes together. Each round takes fifteen minutes and is timed. Once everybody has picked up a card, everybody goes off and does his work for a period of fifteen minutes, and then the bell will go which is a signal for everyone to stop what he/she is doing and come back to the game board. That does not mean that you only have to do one activity in fifteen minutes, it means that if you finish one activity, you hand in your answer sheet and choose another task. The aim is to complete as many activities as possible (four or five) in any one fifteen-minute round, but do them as efficiently as possible.

Everyone takes a turn by tossing the dice to decide who is first, second, and so on. Then each person tosses the dice again, moves his playing piece, and chooses a card from the deck which belongs with the square on which he landed.

The Chance Deck contains different things such as a giveaway aspect similar to that of a "Monopoly" game. An example of this is a card which says, "You have found some golden treasure, you get two points." On that card you will find little stickers; pick one sticker off and give it to the scorekeeper. In other words, the Chance Deck is not really just for learning things, but you are also given the opportunity for getting points as a free bonus.

There are two decks: the orange Activity and the pink Question Decks. The aim of these activities is to get your answers from any resource material in the library as quickly and as efficiently as possible. That doesn't mean spending a lot of time searching for five books and comparing answers. This is a one or two shot deal so that you get the answer in the fastest way you know how.

When we deal with the special orange Activity Cards which have squares in the corners, the Problem-Solving Activity Cards, you have to use an entirely different procedure. Here no answer should be obtained from encyclopedias alone. This type of activity is going to force you to use other reference books. Filmstrips and journals are very time-consuming so that with a fifteen-minute time limit I would advise avoiding these types of materials. But any other types of materials may be used. This is the typical problem solving activity, and I will demonstrate the procedure to you. This is the only type of task which requires demonstration because it is the most complicated aspect of the game. The problem is, "Why did dinosaurs become extinct?"

All I am doing is showing you how I would go about handling a Problem Solving Activity. First, this card is not only presenting you with the problem, it provides a lot of information: what the problem includes and how to go about finding the information. These cards must be read carefully. Clue 1 says that things involved in the problem of dinosaurs and extinction include what dinosaurs were like, and how they were built. Second, what were the dinosaurs' habits--what food did they eat, where did they live. Other things include what was the climate like in the regions in which they lived, and when did they live, and who were their enemies. You have been presented with the first part of the problem, "How dinosaurs became extinct." The card goes on to tell you in what sources you will find the answers to various parts of the problem. It tells you to find and gather all the books all at one time that apply to this question, "What are dinosaurs like, and how did they become extinct." If there are many references on the subject, choose only the three or four best ones, otherwise you will not have the time to complete the activity.

The following is the procedure you should use to complete a Problem Solving Activity. Place your name on the activity number in the right place on an answer sheet and take a pencil, the answer sheet, and the Activity Card along with you. Next I have to find out where the materials about dinosaurs are located. If I had no notion about this library, what would you advise me to do? Where would you advise me to go? I wouldn't look through the shelves because it would take me fifteen minutes just to find the references. But I would use the card catalogue. Follow me to the card catalogue. What would I possibly look up--dinosaurs, prehistoric animals? If there is no material available under dinosaurs, we would look under other titles such as prehistoric animals. Use the back of the answer sheet for jotting down notes. Take out the "D" tray. Here are cards with the heading "DINOSAURS," Is that the title of the book? No, it isn't, because if you look through all the cards you will see that they all have the heading "DINOSAURS" which is the topic or subject. Underneath that heading you will find the author's name, and beneath that is the title of the reference. This one happens to be a book called All About Dinosaurs. And it's about dinosaurs and fossils. You will also notice that Roy Chapman Andrews (his last name is Andrews) wrote In the Days of Dinosaurs. Would any of you object to my noting both books down? I note down the call number which tells me where to find the materials, and the titles, and/or the author's name. What about journals and filmstrips, shall we include those? No, we immediately reject these since they are too time-consuming to use in a fifteen-minute time limit, and besides you don't know how to work journals. Now that we have noted down about five references let's go to the shelves. The location of the book depends on what the call number is and on what section of the

library the material is found, e.g. the Science Section, the Geography Section, and so on. We should check the Science Section and try to match the call numbers we have jotted down with the material on the shelves. Gather all the books with the correct call numbers, authors, and titles and bring them to a desk. Looking at the table of contents of the material we have will tell us whether a reference has the information we need. However, we are looking for a reference which not only has the correct information but also contains yellow cards which I have placed in them. So we reject for the moment any material which does not contain yellow Clue Card 2. Let's try this one, the table of contents indicates that it contains the information we need. Chapter headings include "This is a Dinosaur," "Why Dinosaurs Died Out." Let's turn to page 5. We have located yellow Clue Card 2.

The first thing I do so that I don't forget is take one sticker off. Then I go back to the question "What are dinosaurs like?" and jot down on the answer sheet in note form the information given. The Clue Card says, "Now you know what they look like. We also have to find out when they lived." Looking at this time chart we discover that they lived during the Mesozoic Era. Clue Card 2 at the top says "Fine! Now you know what they looked like, when they lived, and what their habits were." You have the information and the sticker. Clue 2 reads, "Now you must find out how dinosaurs became extinct." It continues to say, "Use references on dinosaurs you have already selected." Obviously, the other references should not be considered since they contained no yellow Clue Cards. Now we have to find yellow Clue Card 3. Let's go back to the table of contents of the book we are using. (By the way, leave Clue Cards exactly where you find them because somebody else may pick up the same Activity Card. It must be in the exact place because that's where the answer is

found.) The extinction of dinosaurs is dealt with in the chapter "Why Dinosaurs Died Out," page 42. Here is Clue Card 3. Take one sticker off. We have gained two points already without writing any information. In note form we write the reasons for extinction. Place the stickers on the answer sheet and hand the sheets in to the scorekeeper. The Clue Card says, "Well done! You've found out the reasons for the extinction of the dinosaurs." It goes on to say, "Now make sure you have taken one sticker from yellow Clue Cards 2 and 3. Bring the stickers and the information if you have any back to the game." Each sticker is worth one point and so is the information so that we have a total here of at least four points.

I think I'm anticipating your next question. What happens if you can't find any yellow Clue Cards? What you do is locate and use information from another source. Correct information is worth points. You will get credit for the answer even though you haven't found any stickers. To get the most points you try to locate the yellow cards with the stickers. But if you see that time is running out, write information for that answer anyway. In the same way, if you have located the Clue Cards with the stickers but you have no time to write the answer, collect the stickers, they are worth points as well.

But remember, this long procedure is used only with the Problem Solving Activity Cards with the square in the corner. All other orange Activity Cards and pink question Cards do not require this long procedure. With those you get your answer as quickly and as efficiently as possible from one or two sources. Use the materials that you know how to work with best.

Now we are officially starting. And we'll have time for four complete fifteen-minute rounds of the game. Do you remember the color of the playing piece you chose?

Always take your pencil, the card, and an answer sheet along with you. As soon as all players have tossed the dice, made their moves, and chosen cards, and read them, I start the timer and everyone goes off at the same time.

The reason for the long explanation of the search and find problem solving activities was that pupils in groups processed demonstrated that they had never before been exposed to such tasks and as such were completely at a loss as to where to start and how to carry out the procedure.

APPENDIX H1

FORMS PERTAINING TO THE PERFORMANCE TEST

INSTRUCTIONS FOR PERFORMANCE TEST

A. For Control Group

1. Use the same method you usually use to find any materials available in the library for assignments.
2. Jot down any information you need.
3. Find and take the materials from the shelves to a table.
4. Examine the material you have chosen to decide which is best, second best, third best, and so on.
5. On the back of the small slip of paper, write down the titles of the materials in order of their importance according to how well they answer the assignment.
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.

B. For Experimental Group

As above except item 1.:

1. Say first: Remember how you located materials in the game "Treasure Hunt". Use the same method as you used for the game. Jot information down.
(Continue item 1. as above.)

APPENDIX H2

FACTORS TO EVALUATE PUPIL PERFORMANCE
ON LIBRARY PERFORMANCE TEST

1. The observer's rating is based on some or all of the following factors:
 - (a) use of alphabetical order
 - (b) use of clue words
 - (c) noting call number
 - (d) noting author's name
 - (e) noting title
 - (f) paying attention to other information
 - (g) selecting and eliminating items
 - (h) confidence
 - (i) competence
 - (j) ability to organize work

2. Factors in judging:
 - (a) matching call numbers, titles, authors with books, film strips, vertical file materials, magazines, or other items;
 - (b) displaying recognition of the sequential order of books in the Dewey Decimal Classification System.

3. Consulting special sections; for example areas on animals, vertical files, encyclopedias, magazines, film strip supply. (It is recognized here that many students through previous use of the library know where to find materials in a systematic manner without consulting the card catalogue or, having consulted it, resort to this practice.

4. Matching type of problem with specific encyclopedia (for example on specific people, consulting the biography encyclopedia).
 - (a) locating and using index, either in a special volume or index in each volume;
 - (b) using alphabetical system.

5.
 - (a) consultation of table of contents
 - (b) consultation of index
 - (c) skimming section headings
 - (d) skimming summaries
 - (e) skimming articles

6. Placing them from right to left in order of importance and checking on pad which ones he would use.

APPENDIX H3

EVALUATION SHEET

Date _____

Name of subject _____ Time started: _____

Topic _____ ended: _____

1. The subject demonstrated his ability to USE THE CARD CATALOGUE.

_____	_____	_____	_____	_____
5	4	3	2	1
very capable	capable	fairly capable	incapable	very incapable

2. The subject indicated that he was capable of using the information found in the card catalogue to FIND ITEMS IN the library.

_____	_____	_____	_____	_____
very capable	capable	fairly capable	incapable	very incapable

3. Although he may or may not have consulted the card catalogue, did he demonstrate his ability to LOCATE ITEMS in the different sections of the library?

_____	_____	_____	_____	_____
very capable	capable	fairly capable	incapable	very incapable

4. The subject demonstrated his ability to locate and select sets of encyclopedias and volume.

_____	_____	_____	_____	_____
very capable	capable	fairly capable	incapable	very incapable

5. The subject demonstrated his ability to analyze collected items by examining them.

5	4	3	2	1
very capable	capable	fairly capable	incapable	very incapable

6. This ability (5) was further indicated by the subject's organizing the items in order of importance.

very capable	capable	fairly capable	incapable	very incapable
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APPENDIX H4

TOPICS USED IN THE PERFORMANCE TEST

Date _____

1. Who was Louis Riel and what was the cause he was fighting for?

Name: _____

1. How are volcanoes formed?

Name: _____

1. Why did dinosaurs become extinct?

Name: _____

1. Why are icebergs considered dangerous?

Name: _____

1. What is it like living on a kibbutz in Israel?

Name: _____

1. What is energy or force?

APPENDIX I

"PEP" TALK

INTRODUCTION TO PUPILS

My name is Mrs. Garellek. I have come to Gardenview with an assistant to carry out some research on how pupils use the library. From you we hope to get enough information so that we can develop a new and interesting course to teach pupils how to use the library properly. You have been chosen to help us develop this new program.

This project is not connected with Gardenview, your school work, or with marks. (The only connection is that I have been allowed to work in this school.) This is not a test. The information I gather on this project will be kept strictly confidential by me. No one else will know the results including your teachers. Therefore, I want you to be as honest as possible in your answers.

This experience will not only be one in which you learn something important, but it will be a lot of fun. You will be asked to participate in different activities (such as playing games) at certain times within the next few weeks. If you participate in this project and try to do your best, the experience will improve your projects and assignments.

I would certainly appreciate your cooperation and hope you will agree to participate.

APPENDIX J1

STATISTICAL ANALYSIS OF ATTITUDE TEST (PAPT) DATA

"t" TEST ON THE DIFFERENCE BETWEEN EXPERIMENTAL AND
CONTROL GROUP SCORES ON PRETEST ATTITUDE TEST
(PAPT) FOR ALL TWELVE QUESTIONS

Group	Number	Mean	Variance	Std. Dev.
Experimental	36	44.472	52.314	7.233
Control	36	45.861	42.580	6.525

<u>Mean Diff.</u>	<u>Var. Diff.</u>	<u>Std. Dev. Diff.</u>
1.389	2.636	1.624

"t" = 0.855 at 70 d.f. degrees freedom
p > .1

APPENDIX J2

"t" TEST ON THE DIFFERENCE IN PRETEST RESULTS ON
FOUR ATTITUDE TEST (PAPT) ITEMS (1, 5, 7, 10)

Group	Number	Mean	Variance	Std. Dev.
Experimental	36	14.583	12.593	3.549
Control	36	15.444	8.540	2.922

<u>Mean Diff.</u>	<u>Var. Diff.</u>	<u>Std. Dev. Diff.</u>
0.861	0.587	0.766

"t" = 1.24 at 70 d.f. degrees of freedom

APPENDIX J3

"t" TEST ON THE DIFFERENCE BETWEEN THE PRE- AND POST-
 TEST RESULTS OF THE CONTROL GROUP ON THE ATTITUDE
 TEST (PAPT) ON ALL TWELVE QUESTIONS

Group	Number	Mean	Std. Dev.	Std. Error of Mean
Control	36	45.861	6.525	1.088
Control	36	45.778	6.197	1.033

<u>Mean Diff.</u>	<u>Var. of Diff.</u>	<u>Std. Error of Diff.</u>
0.008	8.879	0.497

"t" = 0.168 at 35 d.f. degrees of freedom
 p > .1

APPENDIX J4

"t" TEST ON DIFFERENCE BETWEEN PRE- AND POSTTEST
 OF EXPERIMENTAL GROUP ON THE ATTITUDE TEST
 (PAPT) FOR ALL TWELVE QUESTIONS

Group	Number	Mean	Std. Dev.	Std. Error of Mean
Experimental	36	44.472	7.233	1.205
Experimental	36	53.528	4.983	0.830

<u>Mean Diff.</u>	<u>Var. of Diff.</u>	<u>Std. Error of Diff.</u>
9.056	21.083	0.765

"t" = 11.833 at 35 d.f. degrees of freedom
 p < .001

APPENDIX J5

"t" TEST ON DIFFERENCE BETWEEN POSTTEST RESULTS OF
 CONTROL AND EXPERIMENTAL GROUPS ON THE ATTITUDE
 TEST (PAPT)--ALL TWELVE QUESTIONS

Group	Number	Mean	Variance	Std. Dev.
Experimental	36	53.528	24.828	4.983
Control	36	45.806	38.504	6.205

<u>Mean Diff.</u>	<u>Var. Diff.</u>	<u>Std. Dev. Diff.</u>
7.722	1.759	1.326

"t" = 5.822 at 70 d.f. degrees of freedom
 p < .001

APPENDIX J6

"t" TEST ON EXPERIMENTAL GROUP'S PRE- AND POSTTEST
 RESULTS ON FOUR ATTITUDE TEST (PAPT) ITEMS
 1, 5, 7, 10)

Group	Number	Mean	Std. Dev.	Std. Error of Mean
Experimental	36	14.583	3.549	0.591
Experimental	36	17.556	2.210	0.368

<u>Mean Diff.</u>	<u>Var. of Diff.</u>	<u>Std. Error of Diff.</u>
2.972	4.828	0.366

"t" = 8.116 at 35 d.f. degrees of freedom
 p < .001

APPENDIX J7

"t" TEST ON THE DIFFERENCE BETWEEN THE PRE- AND
 POSTTEST RESULTS OF THE CONTROL GROUP ON
 FOUR ATTITUDE TEST (PAPT) ITEMS
 (1, 5, 7, 10)

Group	Number	Mean	Std. Dev.	Std. Error of Mean
Control	36	15.444	2.922	0.487
Control	36	15.167	2.667	0.445

<u>Mean Diff.</u>	<u>Var. of Diff.</u>	<u>Std. Error of Diff.</u>
0.278	3.921	0.330

"t" = 0.842 at 35 d.f. degrees of freedom
 p > .1

APPENDIX J8

"t" TEST ON THE DIFFERENCE BETWEEN THE POSTTEST
 RESULTS OF THE EXPERIMENTAL AND CONTROL
 GROUPS ON FOUR ATTITUDE TEST (PAPT)
 ITEMS (1, 5, 7, 10)

Group	Number	Mean	Variance	Std. Dev.
Experimental	36	17.556	4.883	2.210
Control	36	15.167	7.114	2.667

<u>Mean Diff.</u>	<u>Var. Diff.</u>	<u>Std. Dev. Diff.</u>
2.389	0.333	0.577

"t" = 4.138 at 70 d.f. degrees of freedom
 p < .001

STATISTICAL ANALYSES OF INTERVIEW DATA

APPENDIX K1

"t" TEST ON PRETEST INTERVIEW--THIRTEEN QUESTIONS
(1-7, 9-14) OF EXPERIMENTAL GROUP VERSUS
CONTROL GROUP RESULTS

Group	Number	Mean	Variance	Std. Dev.
Experimental	36	46.667	20.571	4.536
Control	36	48.25	24.25	4.924

<u>Mean Diff.</u>	<u>Var. Diff.</u>	<u>Std. Dev. Diff.</u>
1.583	1.245	1.116

"t" ratio = 1.419 at 70 d.f. degrees of freedom
p > .1

APPENDIX K2

"t" TEST COMPARING CONTROL AND EXPERIMENTAL GROUPS'
 PRETEST INTERVIEW SCORES ON FOUR QUESTIONS
 (1, 2, 3, 4)

Group	Number	Mean	Variance	Std. Dev.
Experimental	36	14.750	5.221	2.285
Control	36	15.139	4.123	2.031

<u>Mean Diff.</u>	<u>Var. Diff.</u>	<u>Std. Dev. Diff.</u>
0.389	0.2595	0.509

"t" ratio = 0.763 at 70 d.f. degrees of freedom
 p > .1 Difference between the two groups not
 significant

APPENDIX K3

"t" TEST ON THE DIFFERENCE IN PRETEST ATTITUDE
 INTERVIEW RESULTS ON SEVEN QUESTIONS (1, 3,
 5, 11, 12, 13, 14) BETWEEN THE EXPERI-
 MENTAL AND CONTROL GROUPS

Group	Number	Mean	Variance	Std. Dev.
Experimental	36	25.583	8.421	2.902
Control	36	27.194	10.333	3.214

<u>Mean Diff.</u>	<u>Var. Diff.</u>	<u>Std. Dev. Diff.</u>
1.611	0.521	0.722

"t" = 2.232 at 70 d.f.

p > .01 < .05

APPENDIX K4

"t" TEST ON POSTTEST INTERVIEW--THIRTEEN QUESTIONS
 (1-7, 9-14) RESULTS OF THE EXPERIMENTAL
 GROUP VERSUS THE CONTROL GROUP

Group	Number	Mean	Variance	Std. Dev.
Experimental	36	48.111	28.502	5.339
Control	36	49.389	14.702	3.834

<u>Mean Diff.</u>	<u>Var. Diff.</u>	<u>Std. Dev. Diff.</u>
0.278	1.200	1.095

"t" ratio = 0.254 at 70 d.f. degrees of freedom
 p > .1

APPENDIX K5

"t" TEST ON CONTROL GROUP PRE- AND POSTTEST RESULTS
ON SEVEN INTERVIEW QUESTIONS (1, 3, 5, 11, 12,
13, 14)

Group	Number	Mean	Std. Dev.	Std. Error of Mean
Control	36	27.194	3.214	0.536
Control	36	27.472	2.602	0.434

<u>Mean Diff.</u>	<u>Var. of Diff.</u>	<u>Std. Error of Diff.</u>
0.278	5.121	0.377

"t" = 0.737 at 35 d.f. degrees of freedom
p > .1

APPENDIX K6

"t" TEST EXPERIMENTAL GROUP PRE- AND POSTTEST
 INTERVIEW SEVEN QUESTIONS (1, 3, 5, 11,
 12, 13, 14)

Group	Number	Mean	Std. Dev.	Std. Error of Mean
Experimental	36	25.583	2.902	0.484
Experimental	36	27.222	3.081	0.513

<u>Mean Diff.</u>	<u>Variance of Diff.</u>	<u>Std. Error of Diff.</u>
1.639	5.323	0.385

"t" = 4.262 at 35 d.f. degrees of freedom
 p < .001

APPENDIX K7

"t" TEST ON THE DIFFERENCE BETWEEN THE POSTTEST
 RESULTS OF THE EXPERIMENTAL AND CONTROL
 GROUPS ON SEVEN INTERVIEW QUESTIONS
 (1, 3, 5, 11, 12, 13, 14)

Group	Number	Mean	Variance	Std. Dev.
Experimental	36	27.25	9.05	3.008
Control	36	27.472	6.771	2.602

<u>Mean Diff.</u>	<u>Var. Diff.</u>	<u>Std. Dev. Diff.</u>
0.222	0.439	0.663

"t" = 0.335 at 70 d.f. degrees of freedom
 p > .1

APPENDIX K8

"t" TEST COMPARING CONTROL GROUP PRE- AND POSTTEST
RESULTS ON THIRTEEN INTERVIEW QUESTIONS

Group	Number	Mean	Std. Dev.	Std. Error of Mean
Control	36	48.25	4.924	0.821
Control	36	48.389	3.834	0.639

<u>Mean Diff.</u>	<u>Var. of Diff.</u>	<u>Std. Error of Diff.</u>
0.139	12.466	0.588

"t" ratio = 0.236 at 35 d.f. degrees of freedom

p < .1

APPENDIX K9

"t" TEST COMPARING EXPERIMENTAL PRE- AND POSTTEST
RESULTS ON THIRTEEN INTERVIEW QUESTIONS

Group	Number	Mean	Std. Dev.	Std. Error of Mean
Experimental	36	46.667	4.536	0.756
Experimental	36	48.111	5.339	0.890

<u>Mean Diff.</u>	<u>Var. of Diff.</u>	<u>Std. Error of Diff.</u>
1.444	8.140	0.476

"t" ratio = 3.038 at 35 d.f. degrees of freedom

p < .001

APPENDIX K10

"t" TEST COMPARING CONTROL GROUP RESULTS ON PRE-
 AND POSTTEST INTERVIEWS ON FOUR QUESTIONS
 (1, 2, 3, 4)

Group	Number	Mean	Std. Dev.	Std. Error of Mean
Control	36	15.139	2.031	0.338
Control	36	15.167	1.595	0.266

<u>Mean Diff.</u>	<u>Std. Error of Diff.</u>
0.025	2.256

"t" ratio = 0.111 at 35 d.f. degrees of freedom
 p < .1 No significant difference.

APPENDIX K11

"t" TEST COMPARING PRE- AND POSTTEST EXPERIMENTAL
 GROUP INTERVIEW RESULTS ON FOUR QUESTIONS
 (1, 2, 3, 4)

Group	Number	Mean	Std. Dev.	Std. Error of Mean
Experimental	36	14.75	2.285	0.381
Experimental	36	15.44	2.298	0.383

<u>Mean Diff.</u>	<u>Variance of Diff.</u>	<u>Std. Error of Diff.</u>
0.694	2.390	0.258

"t" ratio = 2.810 at 35 d.f. degrees of freedom
 p < .01

APPENDIX K12

"t" TEST COMPARING EXPERIMENTAL AND CONTROL GROUP
 POSTTEST INTERVIEW RESULTS ON FOUR QUESTIONS
 (1, 2, 3, 4)

Group	Number	Mean	Variance	Std. Dev.
Experimental	36	15.444	2.283	2.298
Control	36	15.167	2.543	1.595

<u>Mean Diff.</u>	<u>Var. Diff.</u>	<u>Std. Dev. Diff.</u>
0.278	0.217	0.466

"t" ratio = 0.596 at 70 d.f. degrees of freedom

p > .1 No significant difference between the groups.

APPENDIX L1

STATISTICAL ANALYSIS OF PERFORMANCE TEST DATA

"t" TEST ON PERFORMANCE TEST SCORES OF
EXPERIMENTAL AND CONTROL GROUPS

Group	Number	Mean	Variance	Std. Dev.
Experimental	36	17.444	11.740	3.426
Control	36	17.472	18.771	4.332

<u>Mean Diff.</u>	<u>Var. Diff.</u>	<u>Std. Dev. Diff.</u>
0.002	0.848	0.921

"t" = 0.003 at 70 d.f. degrees of freedom
p > .1

APPENDIX M

CORRELATION OF GARDENVIEW TEACHERS' EVALUATION
OF ATTITUDES AND ATTITUDE INTERVIEW ITEMS
(N = 72 SS)

	Q u e s t i o n s						
	1	2	3	4	5	6	7
Teachers'	.17	.21	.13	.16	.09	.15	.10
Appraisals	p.076	p.037	p.130	p.089	p.233	p.110	p.198

	Q u e s t i o n s					
	9	10	11	12	13	14
Teachers'	.11	-.19	.14	.09	-.03	.35
Appraisals	p.178	p.048	p.117	p.237	p.398	p.002

CORRELATION BETWEEN GARDENVIEW TEACHERS' APPRAISALS
OF ATTITUDE AND PAPT ITEMS 1, 2, 3, 5, 7, 9, 10
(N = 72 SS)

	Q u e s t i o n s						
	1	2	3	5	7	9	10
Teachers'	.13	.14	.22	.15	.18	.06	.03
Appraisals	p.134	p.115	p.031	p.097	p.061	p.308	p.394

APPENDIX N

STATISTICS "t" TESTS

"t" TEST OF PUPILS' SCORES ON THE GAME

"TREASURE HUNT"

Experimental Group N = 36

Trial	Number	Mean	Std. Dev.	Std. Error of Mean
1 I	36	13.5566	6.236	1.039
2 II	36	18.571	7.081	1.180

<u>Mean Diff.</u>	<u>Var. of Diff.</u>	<u>Std. Error of Diff.</u>
4.528	23.571	0.809

"t" ratio = 5.596 at 35 d.f. degrees of freedom

p < .001

BUDGET
COST ANALYSIS OF RESEARCH

Game Development - 5 months Researcher Salary: November to March	\$ 1250.00
Materials for Game	100.00
Development of PAPT Test: 3 Researchers - 3 Weeks	560.00
Pilot Study using PAPT: Administration - George Iwasechko - 2 Months	500.00
Item Analysis of PAPT Data: 2 Workers - 2 Weeks (25 hours)	80.00
Interview Development: 4 weeks	250.00
Pilot run - 10 hours, 2 days	25.00
Research April and May - 2 months	500.00
Research Assistant - 65 hours @ \$3.00	200.00
Statistical Analysis: Researcher Time - 40 hours	62.50
Computer Time - 1 hour	7.00
	<hr/>
TOTAL COST	\$3,434.50

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