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No. 1707

LEARNING PROJECTS PURSUED BY ADULT
DEGREED ENGINEERS

DISSERTATION

Presented to the Graduate Council of the
North Texas State University in Partial
Fulfillment of the Requirements

For the Degree of

DOCTOR OF PHILOSOPHY

By

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May, 1981

Rymell, Robert G., Learning Projects Pursued by Adult Degreed Engineers. Doctor of Philosophy (Adult/Continuing Education), May, 1981, 159 pp., 31 tables, bibliography, 78 titles.

This study describes the learning projects of a sample of engineers between the ages of 25 and 35 employed by a single employer in Fort Worth, Texas. The problem of this study was the nature and extent of the continuing education programs of young engineers and the implications of these programs to their job requirements and possible employer assistance. The purposes of this study were to determine the number and types of learning projects undertaken each year by engineers with degrees, the number of hours spent by the subjects, the problems experienced, the resources used, the amount of job-related learning projects undertaken, the locations used to pursue learning projects, and whether the learning projects were amenable to assistance from employers.

Thirty subjects were randomly selected from a stratified population of 518 degreed engineers for probing interviews using a modification of Tough's interview schedule. In addition, each subject was asked to check a learning resources sheet which listed twenty-six commonly available learning resources for each learning project undertaken and

a learning problems sheet that contained a list of twenty-one frequently encountered problems associated with learning projects. The length of the research period was twelve months, and only the learning projects that contained seven hours of deliberate learning were counted as learning projects. The data revealed that all thirty engineers in the sample had conducted at least six learning projects during the twelve-month period, providing a mean of 12.4 learning projects for each subject. There were a total of 371 learning projects undertaken by the subjects which consumed a total of 51,062 hours with a mean of 137.6 hours per learning project.

The most frequent problems mentioned by the subjects were (1) deciding about time, (2) obtaining resources, (3) deciding which activities were necessary to learn the desired knowledge or skill, (4) deciding what knowledge or skills they wanted to learn, and (5) applying the knowledge. It was determined that vocational learning projects were the most frequently undertaken followed by home and family life, personal development, hobbies and recreation, current events, religious, and academic and general education learning projects. Each subject used a mean of 4.3 learning resources for each learning project with (1) books, (2) friends, (3) magazines, (4) experts, and (5) peers or co-workers the most frequently used resources.

The home was the most frequently used location where

the learning took place, followed by work, a combination of locations, other locations not specified, libraries, and schools.

It was discovered that vocational learning projects are amenable to assistance should the employer wish to assist. This could be accomplished through providing resources and by providing assistance to employees experiencing problems with vocational learning projects.

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CHAPTER I

INTRODUCTION

Business and industry are spending billions of dollars each year training their employees to become more productive. The fact clearly emerges that business and industry have taken on the responsibility of training their employees in a variety of work-related tasks. Various departments, training, personnel, human resources, and management development have been designated to provide training to make employees more productive. In addition to providing training to make employees more productive through programs such as supervisory development, time management, effective communication, and a host of other training programs, many employers are now providing training in such nonjob-related areas as career development. At the same time, employees are spending a considerable amount of time (both at their place of employment and on their own time) learning about a variety of subjects that are of interest to them.

A comprehensive study examining types of learning that employees are pursuing on their own would be beneficial to employers as well as employees. If, for example, it is determined that employees are learning on their own many of the skills employers are providing through their training

program, then one could supplement the other, or assistance could be provided to employees to help them learn on their own, thus, saving a considerable amount of expense each year by saving time, developmental costs, and instructional costs.

Statement of the Problem

The problem of this study is the nature and extent of the continuing education programs of young engineers and the implication of these programs to their job requirements and possible employer assistance.

Purposes of the Study

The purposes of this study are to answer the following research questions:

1. The number and types of learning projects undertaken each year by engineers between the ages of 25 and 35 with degrees
2. The number of hours spent by the subjects on each learning project
3. The problems the subjects experienced in pursuing the learning projects
4. Whether a majority of learning projects undertaken by the subjects were job-related
5. Whether a majority of the subjects had a preference for certain learning resources
6. Whether a majority of subjects prefer to pursue

their learning projects in their homes

7. Whether these learning projects are amenable to assistance by employers.

Limitations and Delimitations

This study is subject to the following delimitations in generalizing from the data:

1. The subjects are all from one employer
2. The sample is limited to thirty subjects due to the expense incurred by the employer for releasing each subject for a two-hour interview, a total of sixty man-hours
3. The subjects are all engineers between the ages of 25 and 35

In addition to these delimitations, the study is subject to all the limitations recognized in collecting data by interviews.

Significance of the Study

The significance of this study falls into two areas. They are the theoretical area, which includes the extension of knowledge, and the practical area, which includes suggestions for the application of the extension of knowledge.

The theoretical portion of this study should make a significant contribution to the existing body of knowledge concerning learning projects pursued by an occupational group. In addition, the study should contribute to the

existing knowledge concerned with the continuing education of engineers.

From a practical standpoint, this study should provide employers of degreed engineers with an insight as to what their employees are learning, how they are approaching the learning, and what problems the engineers encountered in their learning projects.

Gilbert has noted that in 1975 one hundred billion dollars was spent for adult training in the world of work (9). While some may argue with Gilbert, he does put the costs involved for employers in perspective, and he considers costs such as wages and salaries of the employees while attending the training, as well as the costs incurred by the business and industry training departments. With such enormous costs involved, it is essential that the learning undertaken by adults should be understood.

This study approaches the learning projects of an occupational group (engineers), based on education (engineering degree), age (25-35), and employed by one industrial firm. By focusing on these variables, the study has addressed the expressed concerns of several adult educators. Peters has called for studies that focus on occupational groups (19), Cooligan for studies of business and industry providing potential resources to assist learning projects (2), Hiemstra for research focusing on learning resources that can assist in self-directed learning (10), and Tough for research

relating to self-directed learning within occupations (21). Cross, in her monograph The Missing Link: Connecting Adult Learners to Learning Resources, suggests that adults need help in planning and using learning resources. She states, "If that missing link can be supplied, the learning society can become a reality" (3, p. 43). In addition, the Wing-spread Conference on Lifelong Learning in the Public Interest reported, "Learning opportunities for adults must better bridge the gap between the world of work and the world of learning" (14, p. 11).

What has clearly been lacking in the research up to now is the joining of learning projects with early adulthood developmental tasks to determine if there is any way employers can assist employees in their learning tasks that relate to their occupation. Drucker summarizes it in this manner:

Only when a man applies the information to doing something does it become knowledge. Knowledge, like electricity or money, is a form of energy that exists only when doing work. The emergence of the knowledge economy is not, in other words, part of "intellectual history" as it is normally conceived. It is part of the history of technology, which recounts how man puts tools to work. When the intellectual says "knowledge" he usually thinks of something new. But what matters in the "knowledge economy" is whether knowledge, old or new, is applicable, e.g., Newtonian physics to the space program. What is relevant is the imagination and skill of whoever applies it, rather than the sophistication or newness of the information (5, p. 269).

The development of the individual in an organization is clearly an expensive cost, and the cost must be recovered somewhere. This has caused Machlap to comment:

When the acquisition of knowledge is designed to increase the productive capacity of the recipient when his listening, watching, or reading is intended as learning, and, therefore, intended to serve future ends, his activities should be regarded as production from the economic point of view. In these circumstances, the receiving and absorbing of messages constitute economically as well as technically, production of knowledge in the actor's own mind (15, p. 34).

Drucker carries this view somewhat further when he suggests that "the systematic and purposeful acquisition of information and its systematic application, rather than science or technology, are emerging as the new foundation for work, productivity, and effort throughout the world" (5, p. 266).

While learning projects are common (17), additional attention needs to be devoted to seeking ways in which these learning projects may be harnessed and applied in the work setting.

Definition of Terms

The following terms will have restricted meaning and are thus defined for this study:

1. Engineer refers to those professional subjects included in the study employed by the Fort Worth Division of General Dynamics with engineering degrees, between the ages of 25 and 35, and considered professionals regardless of their job title.
2. Learning project is a "series of related episodes, adding up to at least seven hours. In each

episode more than half of the person's total motivation is to gain and retain certain fairly clear knowledge and skill, or to produce some other lasting change in himself" (20, p. 6).

3. Learning resources are the ways available for anyone to learn about a topic such as those listed on the Learning Resources Sheet.
4. Planner is "...the person (or group or object) that does most of the detailed day-to-day planning in the learning project" (20, p. 1).
5. Young adults are individuals between and including the ages of 25 and 35.
6. Self-directed learning "describes a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (13, p. 8).

Procedures for Collecting Data

The following steps were taken to collect data:

1. Permission was obtained from the Fort Worth Division of General Dynamics to conduct this study. The Fort Worth Division of General Dynamics began

operations in 1942 producing B-24s and B-32s. After World War II, the Fort Worth Division of General Dynamics developed and produced the B-36, B-58, and the F-111. Today, it is producing the F-16, a high performance "multi-role" fighter for the United States and its allies. The F-16 is being produced in five nations with three production lines--Fort Worth, The Netherlands, and Belgium. The Fort Worth Division of General Dynamics has a "single-site" plant that is responsible for the design, development, and production of the F-16 aircraft. The plant is located on a 600-acre site on the west side of Fort Worth, Texas. The complex contains over 100 buildings which contain over 60000,000 square feet under roof. The main plant is over a mile long and contains the necessary elements to produce high volume production of aircraft. The engineering and administrative staffs are located in a 600,000 square foot modern office building (6).

2. The total population employed by General Dynamics is 16,104. All employees in the Research and Engineering Department (2295) between the ages of 25 and 35 whose job classification was regarded as professional in nature and who held a degree in engineering in the disciplines of Aerospace

Engineering, Mechanical Engineering, Electrical Engineering, Civil Engineering, or Chemical Engineering were identified. There was a total of 518 out of 1,562 engineers who met these criteria.

3. Thirty of these employees were selected for personal interviews using a table of random numbers to select the sample.
4. The data for the study were collected through an interview with each subject (see Appendix A). Each interview lasted approximately two hours and was conducted by the researcher.
5. A pilot study was conducted during the months of April and May, 1980, at Gearhart-Owen, where engineers between the ages of 25 and 35 were interviewed. A pilot study was also conducted in May, 1980, at the First of Fort Worth, where degreed bankers between the ages of 25 and 35 were interviewed. These two pilot studies provided insight into the questions used during the interviews. The interview schedule contained many of the questions used by Tough in his studies entitled "The Adult's Learning Projects" and "Learning Without a Teacher." These questions were field-tested by Tough and revised prior to his accepting them. The basic questions have been used by several others (1, 4, 7, 8, 11, 12, 16, 18, 22) in studies addressing

- adult learning projects. Additional questions were designed to determine learning problems encountered and learning resources preferred by the subjects.
6. The interview schedule was sent to six adult education researchers and educators. Each question was rated as (A) acceptable question or (B) unacceptable question. If four of the six experts agreed, the question was acceptable and was retained.
 7. Each of the randomly selected subjects was contacted prior to the interview and arrangements were made regarding the location of the interview and the time frame required.

Procedures for Analysis of Data

To analyze the data the following steps were taken:

1. Data on each learning project were compiled and presented in tabular form so as to present the findings in a manner which would render them useful in describing the learning projects.
2. The information was then classified in tabular form according to categories which were previously identified from the literature.
3. Analysis of the findings, implications, and conclusions were made on the basis of synthesizing the data gathered.

CHAPTER BIBLIOGRAPHY

1. Benson, Frank B., Jr., "Learning Projects of Selected Administrators in Tennessee Colleges and Universities," unpublished doctoral dissertation, Department of Education, University of Tennessee, Knoxville, Tennessee, 1974.
2. Coolican, Patricia M., "The Learning Styles of Mothers of Young Children," unpublished doctoral dissertation, Department of Education, Syracuse University, Syracuse, New York, 1973.
3. Cross, Patricia K., The Missing Link: Connecting Adult Learners to Learning Resources, New York, College Entrance Examination Board, 1978.
4. Denys, L. O. J., "The Major Learning Efforts of Two Groups of Accra Adults," Unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1975.
5. Drucker, Peter F., The Age of Discontinuity, New York, Harper Colophon Books, 1978.
6. Emphasis on Growth Potential, General Dynamics Corporation.
7. Fair, James, "Teachers As Learners: The Learning Projects of Beginning Elementary-School Teachers," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1973.
8. Field, Jeffery L., "Learning Projects of Adults of Low Literacy Attainment in Jamaica," unpublished paper read before the Adult Education Research Conference, San Antonio, Texas, April 6, 1978.
9. Gilbert, Thomas F., "Training: The \$100 Billion Opportunity," Training and Development Journal, 30 (November 1976), 3-8.
10. Hiemstra, Roger, The Older Adult and Learning, Lincoln, Department of Adult and Continuing Education, University of Nebraska, 1975.

11. John, W. E., "Selected Characteristics of the Learning Projects Pursued by Practicing Pharmacists," unpublished doctoral dissertation, Department of Education, University of Georgia, Athens, Georgia, 1973.
12. Johnson, Edwin, "Selected Characteristics of the Learning Projects Pursued by Adults Who Have Earned a High School Equivalency Certificate," unpublished doctoral dissertation, Department of Education, University of Georgia, Athens, Georgia, 1973.
13. Knowles, Malcolm, Self-Directed Learning, New York, New York, Association Press, 1975.
14. Kurland, Norman, "Imperatives for Policy and Action in Lifelong Learning," unpublished report of the 1976 Wingspread Conference on Lifelong Learning in the Public Interest, Racine, Wisconsin, October 21, 1976.
15. Machlup, Fritz, The Production and Distribution of Knowledge in the United States, Princeton, New Jersey, Princeton University Press, 1962.
16. McCatty, C., "Patterns of Learning Projects Among Professional Men," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1973.
17. Penland, Patrick R., "Self-Planned Learning in America," Pittsburgh, University of Pittsburgh, 1977.
18. _____, "Self-Planned Learning in America," unpublished paper read before the Adult Education Research Conference, San Antonio, Texas, April 6, 1978.
19. Peters, John M., and Gordon, R. Susan, "Adult Learning Projects: A Study of Adult Learning in Urban and Rural Tennessee," Knoxville, University of Tennessee, 1974.
20. Tough, Allen, The Adult's Learning Projects, Toronto, Ontario, The Ontario Institute for Studies in Education, 1971.
21. _____, Why Adults Learn, Toronto, Ontario, The Ontario Institute for Studies in Education, 1968.

22. Wickett, R. E. Y., "Adult Learning Projects Related to Spiritual Growth," unpublished paper read before the Adult Education Research Conference, San Antonio, Texas, April 6, 1978.

CHAPTER II

SURVEY OF RELATED LITERATURE

Throughout history, self-planned learning has been important and common (40). In the literature, terms such as self-directed learning, independent learning, self-education, self-instruction, and autonomous learning define the concept of self-planned learning (61). In each definition the learner maintains the control over the what, why, how, where, and when the learning occurs. The learner is responsible for diagnosing his needs, formulating goals, selecting the resources, and selecting the methods to be used (38). Until recently, comparatively little has been known about the individual learner as a self-directed learner.

Houle is regarded as being the first to study the pattern of the individual's entire educational effort (11). Based on his study, he proposed that there were three types of individuals who participated in continuing education: (1) goal-oriented, those who use education as a means to accomplish specific objectives; (2) activity-oriented, individuals who use education to satisfy social needs; and (3) learning-oriented, individuals who seek knowledge for its own sake (26). Sheffield (60) extended Houle's research to include personal goal-oriented, societal goal-oriented,

need fulfillment, and sociability. Ingham's research (28) extended Houle's, adding leisure satisfaction as a learning orientation.

Since these studies were published, a number of others have appeared which have generally supported Houle's topology: Burgess, 1971; Grabowski, 1976; Peters, 1976; and Sovie, 1972 (9, 21, 57, 62). Four years after Houle's research was published, Johnstone and Rivera reported the results of a national survey they had conducted which focused on the educational pursuits of American adults. One of the questions in their interview schedule was worded:

Up to this point, we've been talking about enrollment in courses and attendance at classes. Have you ever tried to teach yourself some subject by means of independent study strictly on your own? (32, p. 524).

The response to this question, as well as others, caused Johnstone and Rivera to estimate that approximately one person in five had been active in some form of learning during the time period from June, 1961, to June, 1962 (32). This response caused the researchers to state:

Perhaps the most surprising . . . is the estimate of close to nine million persons who were active in independent studies. To the author's knowledge, this type of measure has never before been extracted from a national sample of the population--which in itself suggests that self-instruction is probably the most overlooked avenue of activity in the whole field of adult education (32, p. 37).

It should be noted, however, that the interviewer merely asked the question and accepted the response given without any additional questioning or clarification. The

question was not designed to elicit any information concerning the methods or materials used.

The picture that emerged from their study was that self-education was a large component of the way individuals learned about a wide variety of subjects. Their findings point out that self-education accounted for 40 per cent of the general education topics reported, 25 per cent of the vocational topics, 59 per cent of the agriculture topics, 43 per cent of the hobbies and recreation topics, 59 per cent of the home and family topics, 30 per cent of the personal development topics, 13 per cent of the religion topics, 23 per cent of the public affairs topics, and 25 per cent of all other topics (32).

A systematic investigation of the self-learner began to emerge in 1965 with the research of Tough (66). His research concentrated on the planning undertaken by adults during self-planned learning (66). It should be noted, however, that Tough's later research included all learning, such as learning related to the enrollment in a college credit class or learning directed toward attaining a certificate where control of the learning shifts to the teacher (65). A single learning task was referred to as a learning project, which Tough defined as:

. . . a series of related episodes adding up to at least seven hours. In each episode, more than half of the person's total motivation is to gain and retain certain fairly clear knowledge and skill, or to produce some other lasting change in himself (65, p. 6).

Each of the learning projects is comprised of a series of episodes which have a definite beginning and ending and are "held together by the similarity in intent, activity or place of the thoughts and actions that occur during it" (65, p. 7). Tough suggests that the episodes can include "reading, listening, or watching" and can take place in any physical setting. He also specifies that the individual must want to retain the knowledge or skill for at least two days and that the learning project is "fairly clear and definite" as opposed to learning in which the individual does not have a clear understanding (65). McCatty further defines the learning project, stating that "the seven hour (or longer) project is normally composed of a series of learning episodes (although theoretically, it could consist of one long episode)" (43, p. 2). She also notes that planning, preparing, or traveling may be included in the learning project (43).

The seven-hour minimum requirement for learning projects is somewhat arbitrary. In fact, Tough states that:

My reason for choosing the seven hours was partly as a magic number, and partly it's about one working day; and my feeling has been that if someone devotes the equivalent of a working day in trying to learn something, it is worthwhile looking at it (67, p. 58).

There is no suggestion that the learning project must produce visible change in the individual. Indeed, the learner may be interested in gaining new knowledge that may or may not be observable by others. The learner may be

interested in learning about a new technical skill and then never have a chance to demonstrate the new knowledge acquired. Tough notes that:

One major reason for wanting to gain certain knowledge and skill is the expectation of using that knowledge and skill somehow. The learner wants to use or apply it in some future situation. The expectation of somehow using the knowledge and skill was the most common and most important motivation in the 35 learning projects we studied. For example, 71% of the learners were motivated to begin primarily by the desire to use the knowledge and skill they would gain and all 35 learners found that this motivation strengthened their desire to begin learning (65, p. 11).

Tough has adopted the term planner to describe the person, group, or object that does most of the detailed planning for the learning projects. He suggests that the planner decides what the individual should learn as well as how the learning is to take place (65). Tough relates that:

If a person learned about the history of England, we would ask this question: Who or what was responsible for the day to day planning, for deciding the precise information to be learned during each episode, and for choosing the reading materials or other resources and methods to use each time? (65, p. 77).

Tough distinguishes four distinct types of planners:

1. The learner himself. The learner becomes the planner, making most of the decisions concerning what, where, when, and how to learn. The learner may seek outside help or resources from a variety of individuals or materials, but he maintains the responsibility for making the decisions regarding the use of the materials or assistance of the

individual.

2. A nonhuman resource. The individual turns over the responsibility of planning the learning project to a nonhuman resource such as a workbook, series of television programs, programmed instruction book, or a language lab. In this case the detailed planning has been previously arranged and the learner follows the preplanned directions.
3. A person who interacts with the learner on a one-to-one basis. The interaction may be direct, by telephone, or by mail. Examples of this type of planner would include tutors, consultants, doctors, attorneys, or counselors. In this case, the person other than the learner would plan the learning sequence.
4. A group or class. In this learning situation, the planning of the learning would rest with the instructor or the group as a whole (65).

In addition, Tough notes that a fifth possibility would be a mixed planner or a combination of two or more of the four strategies. The mixed planner would occur when less than half of the planning could be identified with more than one planner (65).

Table I provides a summary of six selected studies that illustrate the type of planner used by the subjects while pursuing learning projects.

TABLE I
TYPE OF PLANNER USED IN SELECTED STUDIES

Planner	Researcher					
	Tough 1971 Per Cent	Coolican 1973 Per Cent	Johns 1973 Per Cent	McCatty 1973 Per Cent	Peters 1974 Per Cent	Hiemstra 1975 Per Cent
Self-Planned	68	66	56	76	77	55
Group-Planned	12	16	16	11	11	21
One-to-One	8	13	9	7	6	10
Nonhuman	3	5	19	1	1	4
Mixed	9	0	0	5	5	10
Total	100	100	100	100	100	100

Table I points out that the self-planned learning was the most frequently used in all the studies. McCatty relates:

The data also indicated that when the adult undertakes self-planned learning (100 per cent of the interviewees did so), he does so mainly because he can tailor the material he learns to suit his individual needs. He could judge with some accuracy what he wants to learn, and feels more competent to make this decision himself rather than having it made by another (43, p. 127).

McCatty further relates that:

Perhaps in the self-planned project there is less restriction on the timing, because the learner can participate whenever he is free, and is not dependent on others being available. Convenience and freedom might be factors which promote longer self-planned projects (43, p. 106).

The subjects in previous studies (13, 29, 30, 43, 53) retained control of the majority of learning projects while few projects were under control of a nonhuman resource, a tutor, class, or combination of planners. Penland found that the adult learners feel a strong need to control the pace and character of their learning. He found that only 20 per cent of Americans enroll in a formal school where the responsibility of controlling the learning shifts to the teacher (55).

Tough developed an intensive probing interview schedule that required an average of two hours to complete, so that the individual learning projects could be examined. While the samples used by Tough were small, they were randomly selected from seven populations: blue-collar factory workers, professors, politicians, lower-white-collar men, lower-white-collar women, teachers, and mothers. He found that these adults spent a mean of 816 hours at their learning projects during the preceding twelve months, with a median of 687 hours and with a 98 per cent participation rate (65). He also included learning that was not considered self-directed (such as enrolling in a class for college credit) in order to obtain a complete picture of all learning undertaken by the individual. The possible application of the research conducted by Tough has caused Knowles to comment, "In fact, I now prefer Tough's concept of learning projects as a basis of organizing adult educational programs to my

earlier concept of problem areas" (36, p. 49).

A review of the literature revealed that several studies of different populations have been completed that essentially replicated Tough's. An in-depth, probing interview schedule was constructed by the researchers using the original designed by Tough as a model. The interview schedule was then modified to fit the population under study. The researchers focused on all the learning undertaken by the selected population, so that self-directed learning, as well as learning associated with receiving some form of credit such as a college credit class or a certificate such as a driver's license, was explored. Peters and Gordon studied the learning projects of 466 adults in urban and rural Tennessee (56); Coolican examined the learning styles of mothers with preschool children (11); Fair explored the learning projects of beginning elementary school teachers (15); Field investigated the learning efforts of low literacy attainment Jamaican adults (18); Denys identified the learning projects of African executives and teachers (13); and Johns described the learning projects of metropolitan Atlanta pharmacists (29). In addition, Allerton studied the learning projects of parish ministers in Louisville (1); Benson researched the learning projects of administrators in Tennessee colleges and universities (6); Johnson examined the learning projects of adults with a high school diploma or a high school equivalency certificate (30); Hiemstra

reported the learning projects undertaken by older adults in Nebraska (23); and Kelly studied the learning projects of secondary school teachers (34). McCatty's study of the learning projects of professional men included engineers, dentists, professors, physicians, geologists, lawyers, architects, physicists, pharmacists, judges, teachers, and chemists (43).

Johnson, Levine, and Rosenthal examined the learning projects of unemployed adults in New Jersey (31); Miller interviewed teachers in a rural area of New York (45); Armstrong investigated the learning projects of unemployed adults of low educational attainment (2); Miller and Botsam described the learning projects of cooperative extension agents (46); Booth researched the learning efforts of low income urban adults (7); Wickett studied learning projects related to spiritual growth (70); and Penland conducted a national study that included 1,501 adults randomly selected throughout the United States (54).

There have been additional studies that have focused on related aspects. Farquharson studied the learning that occurred in a peer group (16); Morcroft researched the origin of current learning projects (47); Morris studied the planning steps (48); and Luikart examined people who provided assistance with learning projects (42).

These studies have confirmed Tough's original findings that individuals spend a considerable amount of time each

year pursuing learning projects. The mean number of hours varies from 250 hours (11) to 1,244 hours (43), but each study points out that a considerable number of hours is devoted to learning projects by the subjects. The number of hours involved varies greatly within the populations. Some individuals report no learning projects (23, 53, 65), while one individual reported 6,165 hours (29). Although the total number of hours for this individual appeared inflated, Johns reconciled this by stating:

The researcher has appeared to have two options, to accept the data to maintain consistency in methodology, or to delete the subject and response. Because of the questionable nature of this response some may wish to delete the response from the sample (29, p. 37).

While the individual maintains control of many of the individual learning projects, individuals receive a large amount of assistance from a large number of people such as colleagues, friends, and family members (67). Tough suggests this may result from the fact that the learner is not familiar with the content, he is not trained in learning, he may have doubts about his ability to learn, and he probably has contact with a fairly large number of people during his daily activities (65).

Individuals also utilize a variety of resources in pursuing their individual learning projects. Houle describes a learning resource as ". . . any object, person, or other aspect of the environment which can be used for support or help in an educational activity" (25, p. 152). Tough

classifies the learning resources as human and nonhuman resources (65). Examples of human resources include friends, teachers, librarians, and doctors, while nonhuman resources include such resources as books, television, magazines, and programmed instruction. The different possibilities of learning resources available to assist the individual learner are many, and as Houle notes, ". . . while the scarcity of learning resources is still the major problem for most people in the world, for others the central difficulty is one of choice" (25, p. 155).

Training in Business and Industry

The roots of training extend far back in time. The apprenticeship is one of the oldest forms of training in business. This training involved a contract under which the master undertook the obligation of training an apprentice in a trade or profession. "There is evidence in the Code of Hammurabi (285-42 B.C.) that the practice was so firmly established in ancient Babylonia as to warrant state supervision" (12, p. 2). Guilds and craft training followed the apprenticeship system. In the United States these forms of training gradually gave way to the changes resulting from the industrial era and the accompanying shift from an agrarian to an industrial economy (63). This era saw the development of such forms of training as factory schools, vocational training, instruction shops, and construction

shops (12).

The Second World War created a new interest in training. There was a need to quickly train thousands of people to take over new tasks as industries responded to the war effort (64). Following the war, men and women returned to their normal jobs and found that retraining was necessary while others were looking for training that provided a skill so that they could earn a living (64).

Training is now considered to refer to activities such as the acquisition of simple motor skills to the change and development of complex socio-emotional attitudes (4). Chruden and Sherman classify training techniques or methods used in training employees as on-the-job techniques such as job instruction training, apprenticeships, job rotation, junior board, and coaching, which are contrasted to off-the-job techniques such as vestibule training, lecture, special study, films, television, conference or discussion, case study, role playing, simulation, programmed instruction, laboratory training, and programmed group exercises (10). They point out that a wide variety of techniques or methods are commonly used today to bring about learning. Folley feels that

. . . learning is precisely what training is all about. Training exists to bring about learning. Training is an overt process, a sequence of experiences, a series of opportunities to learn in which the trainee is exposed in some more or less systematic way to certain materials or events (19, p. 34).

Regardless of the responsibilities one assigns to the training department, its prime responsibility is the development of all the people who work in that organization. It should also be apparent that the mission of the training department must be productive in the sense that it assists its organization to reach its goals (44). Certainly, if the training department cannot offer this assistance, then there is little need for its existence.

Human Resources Development is often used to describe the same process as training, which is essentially concerned with making the business function more effectively and more efficiently. To achieve this goal, the Human Resources Development concept calls for providing (1) training, which improves an employee's present job performance; (2) development, which prepares employees for jobs at higher levels, (3) education, which concentrates on improving the thinking and understanding of the employee as well as providing an increased breadth of knowledge; and (4) rehabilitation, which provides special skills and attitudes for individuals with special problems such as alcohol or drugs (35).

Whether one selects the training or the Human Resources Development label, there has been an expansion of responsibilities that fall under the jurisdiction of this function. This growth has generated an increased interest in reducing the costs involved, which clearly surface in a review of the literature (3, 8, 49, 50, 51, 58, 71).

One approach that addresses the issue of cost reduction is with informal learning. Informal learning is considered to be planned learning that takes place in a setting without a formal curriculum or instructor (14); hence, there would be no cost incurred by the employer unless the employer provided resources to assist the employee. Bell illustrates that informal learning can be encouraged by organizations offering a case study in which a bank included a book review in its division newsletter with responsibility for each review rotating among the bank's six departments. He concluded that employee learning went up significantly (5). Bell's case study caused Dubrin to suggest that informal learning of this type can be "highly cost effective" (14).

The engineer creates a challenge for training departments, especially in those employment settings that deal with high technological change. Ferdinand depicts engineers employed by defense industries as constantly facing new problems that result from contracts that call for the production of a small number of units of highly sophisticated equipment. This dependence on short-run contracts forces the engineer to keep abreast in his field in order to maintain his employment (17). Karger and Murdick state, "There was a time when many companies (and many engineers) thought that when the engineer had obtained his degree, school was over" (33, p. 121). They suggest that this is no longer the case due to (1) the realization that an undergraduate

engineering program cannot provide the engineer with the depth and breadth needed for an engineering career, (2) rapidly changing knowledge causing the need to train engineers to use new techniques and concepts, and (3) their backgrounds usually do not match the needs of their employer and the company expects to train them to satisfy its needs (33).

While many employers have recognized the special needs of engineers for training due to the rapid advances in technology, the program formats have been essentially the same as the programs provided to other employees (20, 69). Knowles feels that by the mid-eighties a large percentage of adults will have had enough exposure to self-directed learning that they will begin to demand it in their training programs (37). Knowles further suggests that a problem that training departments will soon face is to be able to provide a more flexible and diverse delivery system for training programs that provide for employees to learn at their individual pace and at times and places the employee finds convenient (37). In addition to the changes that Knowles foresees, Tough notes that a trend seems to be emerging whereby people are now beginning to select employment that ". . . seems to be educative, and corporations or employers that will be educative" (67, p. 64), while Schultz relates that a good company training program is regarded by many employees as an important fringe benefit (59).

Because the worker's desires for job changes and occupational mobility may severely tax the educational community, Kurland feels that employers must address the needs of workers' personal and job interests (41). O'Toole states that all workers want to grow and learn (52), while Smith notes what the individual expects the role of training to be when he states:

Experience shows that adults will accept the need for training if (1) they are convinced of its utility, (2) if the training has the possibility of a larger payoff (e.g. acquiring learning skills that can be used in other groups to which one belongs or in comparable situations one commonly encounters), and (3) the training is clearly related to learning problems trainees have previously encountered (61, p. 59).

While these changes may cause adjustment problems for training departments, these new developments may strengthen the training activity as the individuals learn more about adult learning. Employees have been expecting more from the training departments because they want to use what they learn (39). And the more adults learn, the more they want to learn (24, 27).

Summary

Recent studies have pointed out that adults conduct a number of learning projects and devote a large amount of time during the course of a year to pursuing their learning projects. At the same time, training departments provide a variety of training programs for employees to address the needs of employers. The wide variety of programs has been

caused in part by the rapid technological changes that have occurred, especially the technological changes encountered by engineers. At the same time, employers have been attempting to hold down costs by seeking new and more efficient training methods. A search of the literature did not reveal any attempt to join the learning projects undertaken by adults and the needs of training departments.

CHAPTER BIBLIOGRAPHY

1. Allerton, T. D., "Selected Characteristics of the Learning Projects Pursued by Parish Ministers in the Louisville Metropolitan Area," unpublished doctoral dissertation, Department of Education, University of Georgia, Athens, Georgia, 1974.
2. Armstrong, David, "Adult Learners of Low Educational Attainment: The Self Concepts, Background and Educative Behavior of Average and High Learning Adults of Low Educational Attainment," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1971.
3. Ashkenas, Ronald N., and Schaffer, Robert H., "Management Training for Bottom-Line Results," Training and Development Journal, 33 (August 1979), 17-22.
4. Bass, Bernard M. and Vaughan, James A., Training in Industry: The Management of Learning, Belmont, California, Brooks-Cole Publishing Company, 1966.
5. Bell, Chip R., "Informal Learning in Organizations," Training and Development Journal, 31 (June 1977), 280-83, 313.
6. Benson, Frank B., Jr., "Learning Projects of Selected Administrators in Tennessee Colleges and Universities," unpublished doctoral dissertation, Department of Education, University of Tennessee, Knoxville, Tennessee, 1974.
7. Booth, Nan, "Information Resource Utilization Patterns and the Learning Efforts of Low Income Urban Adults," unpublished paper read before the Adult Education Research Conference, Ann Arbor, Michigan, April 5, 1979.
8. Brown, Mark G., "Evaluating Training Via Multiple Baseline Designs," Training and Development Journal, 34 (October 1980), 11-16.
9. Burgess, Paul D., "Reasons for Adult Participation in Group Educational Activities," Adult Education, 22 (Fall 1971), 3-29.

10. Chruden, Herbert J., and Sherman, Arthur W., Jr., Personnel Management: The Utilization of Human Resources, Cincinnati, Ohio, South-Western Publishing Company, 1980.
11. Coolican, Patricia M., "The Learning Styles of Mothers of Young Children," unpublished doctoral dissertation, Department of Education, Syracuse University, Syracuse, New York, 1973.
12. DeCarlo, Charles R., and Robinson, Ormsbee, W., Education in Business and Industry, New York, The Center for Applied Research in Education, 1966.
13. Denys, L. O. J., "The Major Learning Efforts of Two Groups of Accra Adults," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1975.
14. Dubrin, Andrew J., Personnel and Human Resources Management, New York, D. Van Nostrand Company, 1981.
15. Fair, James, "Teachers as Learners: The Learning Projects of Beginning Elementary-School Teachers," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1973.
16. Farquharson, A., "Peers as Helpers: Personal Change in Members of Self-Help Groups in Metropolitan Toronto," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1975.
17. Ferdinand, Theodore N., "On the Obsolescence of Scientists and Engineers," American Scientist, 54 (March 1966), 46-56.
18. Field, Jeffery L., "Learning Projects of Adults of Low Literacy Attainment in Jamaica," unpublished paper read before the Adult Education Research Conference, San Antonio, Texas, April 6, 1978.
19. Folley, John D., Jr., "The Learning Process" in Training and Development Handbook, edited by Robert L. Craig and Lester R. Bettel, New York, McGraw-Hill, 1967.
20. Goldstein, Irwin L., Training: Program Development and Evaluation, Monterey, California, Brooks-Cole Publishing Company, 1974.

21. Grabowski, Stanley M., "Motivational and Participation Patterns," in Materials and Methods in Continuing Education, edited by Chester Klevins, New York, Klevens Publications, Inc. 1976.
22. Hayes, James L., "Human Resources--The Last Resources of a Frontier Society?", Training and Development Journal, 30 (June 1976), 8-10.
23. Hiemstra, Roger, "The Older Adult and Learning," Lincoln, Department of Adult and Continuing Education, University of Nebraska, 1975.
24. Houle, Cyril O., Continuing Learning in the Professions, San Francisco, California, Jossey-Bass, Inc., 1980.
25. _____, The Design of Education, San Francisco, California, Jossey-Bass, Inc., 1972.
26. _____, The Inquiring Mind, The University of Wisconsin Press, Madison, 1961.
27. _____, "The Nature of Continuing Professional Education," in Adult Learning: Issues and Innovations, edited by Robert M. Smith, DeKalb, Illinois, Department of Secondary and Adult Education, Northern Illinois University, 1976.
28. Ingham, Roy, "The Relationship of Educative Behavior to the Leisure Satisfaction of College Alumnae," in The Continuing Learner, edited by D. Solomon, Chicago, Center for the Study of Liberal Education for Adults, 1963.
29. Johns, W. E., "Selected Characteristics of the Learning Projects Pursued by Practicing Pharmacists," unpublished doctoral dissertation, Department of Education, University of Georgia, Athens, Georgia, 1973.
30. Johnson, Edwin, "Selected Characteristics of the Learning Projects Pursued by Adults Who Have Earned a High School Equivalency Certificate," unpublished doctoral dissertation, Department of Education, University of Georgia, Athens, Georgia, 1973.
31. Johnson, V., Levine, H., and Rosenthal, E., "Learning Projects of Unemployed Adults in New Jersey," New Brunswick, New Jersey, Educational Advancement Project, Rutgers Labor Education Center, 1977.

32. Johnstone, John W. C., and Rivera, Ramon J., Volunteers for Learning, Chicago, Aldine Publishing Company, 1965.
33. Karger, Delmar W., and Murdick, Robert G., Managing Engineering and Research, New York, Industrial Press, Inc., 1969.
34. Kelly, N. E., "A Comparative Study of Professionally Related Learning Projects of Secondary School Teachers," unpublished master's thesis, Department of Education, Cornell University, 1976.
35. Klatt, Lawrence A., Murdick, Robert G., and Schuster, Fred E., Human Resources Management, Homewood, Illinois, Irwin-Dorsey Limited, 1978.
36. Knowles, Malcolm, The Adult Learner: A Neglected Species, Houston, Texas, Gulf Publishing Company, 1973.
37. _____, "Gearing Up for the Eighties," Training and Development Journal, 32 (July 1978), 12-14.
38. _____, Self-Directed Learning, New York, Associated Press, 1975.
39. Knox, Alan B., "Helping Adults to Learn," in Adult Learning: Issues and Innovations, edited by Robert M. Smith, DeKalb, Illinois, Department of Secondary and Adult Education, Northern Illinois University, 1976.
40. Kulich, Jindra, "An Historical Overview of the Adult Self-Learner," International Congress of University Adult Education Journal, 9 (September 1970), 22-32.
41. Kurland, Norman, "Imperatives for Policy and Action in Lifelong Learning," unpublished report of the 1976 Wingspread Conference on Lifelong Learning in the Public Interest, Racine, Wisconsin, October 21, 1976.
42. Luikart, Clark, "Social Networks and Self-Planned Adult Learning," unpublished doctoral dissertation, University of North Carolina, Chapel Hill, North Carolina, 1975.

43. McCatty, C., "Patterns of Learning Projects Among Professional Men," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1973.
44. McGehee, William, and Thayer, Paul W., Training in Business and Industry, New York, John Wiley and Sons, Inc., 1961.
45. Miller, N. L., "Teachers and Non-Teaching Professionals as Self-Directed Learners," unpublished master's thesis, Department of Education, Cornell University, 1977.
46. —————, and Botsman, P., "Continuing Education for Extension Agents," Human Ecology Forum, 6 (1975), 14-17.
47. Moorcroft, R., "The Origins of Women's Learning Projects," unpublished master's thesis, Department of Education, University of Toronto, Toronto, Canada, 1975.
48. Morris, John F., "The Planning Behavior and Conceptual Complexity of Selected Clergymen in Self-Directed Learning Projects Related to Their Continuing Professional Education," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1977.
49. Nickols, Frederick W., "Finding the Bottom-Line Payoff for Training," Training and Development Journal, 33 (December 1979), 54-63.
50. Odiorne, George, "The Need for an Economic Approach to Training," Training and Development Journal, 33 (June 1979), 32-40.
51. Olival, Louis, "Auditing Your Training and Development Function," Training and Development Journal, 34 (March 1980), 60-64.
52. O'Toole, James, "Integrating Work and Learning," Training and Development Journal, 31 (June 1977), 36-48.
53. Penland, Patrick R., "Self-Planned Learning in America," Pittsburgh, Pennsylvania, Graduate School of Library and Information Sciences, University of Pittsburgh, 1977.

54. _____, "Self-Planned Learning in America," unpublished paper read before the Adult Education Research Conference, San Antonio, Texas, April 6, 1978.
55. _____, "Individual Self-Planned Learning in America," Summary Report, Pittsburgh, Pennsylvania, University of Pittsburgh, July 15, 1977.
56. Peters, John M., and Gordon, R. Susan, "Adult Learning Projects: A Study of Adult Learning in Urban and Rural Tennessee," Knoxville, University of Tennessee, 1974.
57. _____, and Boshier, Roger, "Adult Needs Interests and Motives," in Materials and Methods in Continuing Education, edited by Chester Klevins, New York, Klevins Publications, Inc., 1976.
58. Schoonmaker, Robert L., "Training Trainers on a Tight Budget," Training and Development Journal, 33 (January 1979), 8-10.
59. Schultz, Duane, Psychology and Industry Today, New York, The Macmillan Company, 1973.
60. Sheffield, S. D., "The Orientations of Adult Continuing Learners," in The Continuing Learner, edited by D. Solomon, Chicago, Center for the Study of Liberal Education for Adults, 1964.
61. Smith, Robert M., Learning How to Learn in Adult Education, DeKalb, Illinois, Department of Secondary and Adult Education, Northern Illinois University, 1976.
62. Sovie, Margaret D., "The Relationships of Learning Orientations, Nursing Activities and Continuing Education," unpublished doctoral dissertation, Department of Education, Syracuse University, Syracuse, New York, 1972.
63. Steinmetz, C. S., "The Evolution of Training," in Training and Development Handbook, edited by Robert L. Craig and Lester R. Bittel, New York, McGraw-Hill, 1967.
64. Tickner, Fred, Training in Modern Society, Albany, New York, Williams Press, 1966.

65. Tough, Allen, The Adult's Learning Projects, Toronto, Ontario, The Ontario Institute for Studies in Education, 1971.
66. ———, "Learning Tasks Performed by Adult Self-Teachers," unpublished doctoral dissertation, Department of Education, University of Chicago, Chicago, Illinois, 1965.
67. ———, Learning Without a Teacher: A Study of Tasks and Assistance During Adult Self-Teaching Projects, Toronto, Canada, Ontario Institute for Studies in Education, 1979.
68. ———, "Self-Planned Learning and Major Personal Change," in Adult Learning: Issues and Innovations, edited by Robert M. Smith, DeKalb, Illinois, Department of Secondary and Adult Education, Northern Illinois University, 1976.
69. Tracey, William R., Managing Training and Development Systems, New York, AMACON, 1974.
70. Wickett, R. E. Y., "Adult Learning Projects Related to Spiritual Growth," unpublished paper read before the Adult Education Research Conference, San Antonio, Texas, April 6, 1978.
71. Wilson, Clark, "Identify Needs with Costs in Mind," Training and Development Journal, 34 (July 1980), 58-62.

CHAPTER III

PROCEDURES OF THE STUDY

Population and Sample Selection

The participants for this study were selected from a list of engineers employed in the Research and Engineering Department of the Fort Worth Division of General Dynamics. The total population of employees who held job classifications that were regarded as engineers was 1,562 individuals. This list was further stratified so that only employees between and including the ages of 25 and 35 were identified. An additional criteria that the employee hold a degree in Aerospace Engineering, Mechanical Engineering, Electrical Engineering, Civil Engineering, or Chemical Engineering was imposed so that the original listing of 1,562 employees was reduced by further stratification to a total of 518 employees. Each of the 518 employees fit the following selection criteria:

1. Employed by the Fort Worth Division of General Dynamics
2. Employed in the Research and Engineering Department
3. Between and including 25 and 35 years of age
4. Hold degrees in the disciplines of Aerospace Engineering, Mechanical Engineering, Electrical

Engineering, Civil Engineering, or Chemical Engineering at the B.S., M.S., or Ph.D. level

Each name was assigned a number from one to five hundred and eighteen. A table of random numbers was used to select the first thirty names of engineers. Entry into the table of random numbers was gained by placing a pencil point randomly on the page and then starting with the number nearest to the pencil point, thus selecting the next thirty numbers.

Each employee was then entered on a list and assigned a time for the interview. A memo outlining the interview procedure and urging support for the study was sent to the Vice-President of Research and Engineering from a Director in the Research and Engineering Department. A copy of this memo, along with the list of employees and their scheduled time for an interview, was sent to each of the thirty employees selected.

Each employee on the list was interviewed for a total completion rate of 100 per cent. Six individuals were interviewed at times other than the appointed times, and this was accomplished by a revision of the original scheduled times of the employees. Each employee was interviewed during regularly scheduled working hours. The interviews began at 10:00 a.m. or 1:00 p.m. so that the six employees re-scheduled were able to meet either the 10:00 a.m. or 1:00 p.m. interview appointment, although on a different

date.

Interview Instrument

The complete interview instrument was in three parts-- an interview schedule, a learning resources sheet, and a learning problems sheet. (See Appendixes A, B, and C).

A revised version of Tough's interview schedule was used for the portion of the interview that dealt with the learning projects that were undertaken by the subjects during the preceding twelve months. Tough's interview schedule was constructed in September, 1969, with revisions in October and November, 1969, and a final version constructed in April, 1970 (1).

The learning resources sheet consisted of twenty-five resources commonly available to assist an individual in learning about a topic. An additional option, listed as "Other," with a space in which to identify the resource used, was added. In addition, a list of twenty-one of the most frequently encountered problems associated with learning projects was constructed (2).

The revised interview schedule, along with the learning resources sheet and the learning problems sheet, were sent to five experts in the field of adult education with a request to judge each item and assess its acceptability. Each item was rated acceptable by at least four of the five experts. In addition, copies of the interview schedule,

the learning resources sheet, and the learning problems sheet were sent to Tough for his comments.

The interview schedule, learning resources sheet, and learning problems sheet were subjected to two separate pilot programs in order to field test each of them. A pilot program was conducted at Gearhart-Owen Company, where five engineers were interviewed. A pilot program was also conducted at the First National Bank of Fort Worth, where four bankers were interviewed. In both pilot programs, the interviewees were all between the ages of 25 and 35 and had earned college degrees. Of the nine subjects interviewed, eight had attained either a B.S. or B.A. degree, while one had completed an M.S. degree.

The interview schedule, learning resources sheet, and learning problems sheet were reviewed and evaluated by the interviewer and determined to be appropriate with no changes required.

Interview Procedure

Each of the interviews was conducted during normal working hours for the employees. One half of the interviews began at 10:00 a.m., while the other half began at 1:00 p.m. The interviews were conducted in a conference room in the Engineering Personnel section of the Fort Worth Division of General Dynamics. In only two cases were the interviewees late for the scheduled interview, and these delays were

caused by job-related problems that developed at the last minute. In each case the interview period was extended in order to accommodate the employee's schedule.

It was discovered that the employees were directed to appear for the interview at the appointed time so that it was necessary to explain the purpose of the interview to each person, as well as assuring them that there was no risk involved on their part. Each was assured that no information that could be traceable to them would be revealed to their employer. They were further assured that the information obtained from the interview would be compiled along with twenty-nine other interviewees and reported in that way. Each was amenable to the interview after the explanation and after being informed that if they felt uncomfortable in responding to any of the questions, they could terminate the interview at any time with no penalty attached. All interviews were conducted by the researcher.

After these opening remarks, the interviewees were introduced to the concept of learning projects as they were led through the interview schedule. Tough estimated that it took between twenty and twenty-five minutes for the subjects to comprehend what the researchers were seeking (3). The subjects in this study were quick to understand the concept, and in no case did it take longer than five minutes for the interviewees to understand the type of learning sought.

The interview schedule and process provided time for

repeated probing-type questions in areas that the interviewer wanted to clarify. In this way, each learning project recorded was understood by the interviewer and found to meet the established criteria.

Once the subject ceased to recall any additional learning projects, a sheet was provided which was designed to prompt additional responses. (See Appendix B, pp. 110-11.) This detailed examination of each learning project provided an additional opportunity for the interviewer to probe in more detail the individual efforts behind each learning project.

Once the examination of each project was completed, each interviewee was asked to check each resource he used while pursuing that learning project. (See Appendix D.) Once the learning resource sheet was completed, the interviewees were asked to check any problems they had encountered with the learning project on the learning problems sheet. (See Appendix C.)

At the conclusion of the interview, the subject was thanked for participating and given an opportunity to raise any questions he had concerning the interview. The primary question asked by many of the interviewees revolved around how the information obtained during the interview would be used in the research.

The average interview lasted one hour and forty-three minutes, and the range was from one hour and ten minutes to

two hours and fifteen minutes.

Analysis of the Data

A coding sheet was developed that followed the questions asked during the interview. After the interviews were conducted, each learning project, along with the relevant data, was categorized and coded by the interviewer. This procedure resulted in overall consistence in the interpretation of the data. The data were then key punched and verified. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) computer program to provide descriptive statistics, such as frequency distributions and measures of central tendency.

CHAPTER BIBLIOGRAPHY

1. Tough, Allen., "Interview Schedule for a Study of Some Basic Characteristics of Learning Projects in Several Populations," Toronto, Canada, The Ontario Institute for Studies in Education, April 1970. (Mimeographed.)
2. _____, Learning Without a Teacher, Toronto, Canada, The Ontario Institute for Studies in Education, 1967.
3. _____, "Self-Planned Learning and Major Personal Change," in Adult Learning: Issues and Innovation, edited by Robert M. Smith, DeKalb, Illinois, Department of Secondary and Adult Education, Northern Illinois University, 1976.

CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

The results of this study were based on the data obtained from a randomly selected group of engineers employed in the Research and Engineering Department of the Fort Worth Division of General Dynamics. Table II reflects the highest degree held by the employees included in the sample.

TABLE II
HIGHEST DEGREE HELD BY ENGINEERS IN THE STUDY
(N=30)

Degree	Number of Subjects	Per Cent of Subjects
Bachelor's	22	73.3
Master's	7	23.3
Doctor of Philosophy	1	3.3

Over three times as many subjects held a Bachelor's degree as those holding a Master's degree, while one subject, or 3.3 per cent of the sample, held a Doctor of Philosophy degree. The subjects received their degrees in one of four disciplines. Aerospace Engineering accounted for a majority (fourteen) of the subjects, Electrical Engineering accounted for eight subjects, Mechanical Engineering accounted for six

subjects, and Civil Engineering accounted for two subjects. Table III describes the discipline and highest degree achieved by each of the thirty subjects.

TABLE III
DISCIPLINE AND HIGHEST DEGREE HELD
BY THE SUBJECTS
(N=30)

Degree	Number of Subjects	Per Cent of Subjects
Aerospace Engineering		
B.S.	11	36.6
M.S.	3	10.0
Civil Engineering		
B.S.	2	6.6
Electrical Engineering		
B.S.	5	16.6
M.S.	2	6.6
Ph.D.	1	3.3
Mechanical Engineering		
B.S.	4	13.3
M.S.	2	6.6

The largest number of subjects (eleven) received a B.S. degree in Aerospace Engineering, followed by five subjects who had received a B.S. in Electrical Engineering, four who had received a B.S. in Mechanical Engineering, and three who had received an M.S. in Aerospace Engineering. There were two who had received a B.S. in Civil Engineering, two who had received an M.S. in Electrical Engineering, two who had received an M.S. in Mechanical Engineering, and one who had

received a Ph.D. in Electrical Engineering.

The subjects ranged in age from 25 to 35, as depicted in Table IV.

TABLE IV
AGE DISTRIBUTION OF THE SUBJECTS
(N=30)

Age	Number of Subjects	Per Cent of Subjects
25	2	6.6
26	6	20.0
27	6	20.0
28	3	10.0
29	1	3.3
30	1	3.3
31	1	3.3
32	3	10.0
33	3	10.0
34	2	6.6
35	2	6.6

Over half (56.6 per cent) were 28 years or younger, while the average age was 29.2 years.

The population included twenty-eight male and two female engineers. Twenty-two, or 73 per cent, of the subjects were married, while eight, or 27 per cent, were either

single or divorced. Twenty-eight of the subjects were Caucasian, while one was black, and one was Spanish-American.

The subjects received their degrees from nineteen different engineering schools. One had completed a Master of Science degree from Southern Methodist University while employed at General Dynamics, attending classes on a part-time basis. This was the only individual with an advanced degree who had not received the advanced degree from the same university that awarded the undergraduate degree. Table V lists the universities, along with the number of subjects receiving their degrees from that university and the percentage of subjects graduating from the university.

TABLE V
UNIVERSITY SUBJECTS GRADUATED FROM
(N=30)

University	Number of Subjects	Per Cent of Subjects
University of Texas-Austin	4	13.3
Iowa State University	2	6.6
Oklahoma State University	2	6.6
Virginia Polytechnical Institute	2	6.6
University of Texas-El Paso	1	3.3
University of Michigan	1	3.3
Michigan State University	1	3.3
University of Texas-Arlington	5	16.6

TABLE V--Continued

University	Number of Subjects	Per Cent of Subjects
University of Oklahoma	1	3.3
Georgia Institute of Technology	2	6.6
University of Illinois	1	3.3
San Diego State University	1	3.3
University of Florida	1	3.3
Louisiana Polytechnical Institute	1	3.3
Texas A&M University	2	6.6
University of Pittsburgh	1	3.3
Massachussetts Institute of Technology	1	3.3
Kansas State University	1	3.3
Southern Methodist University*	1	N/A

*Reflects one subject who received degrees from two universities. All other subjects with advanced degrees received undergraduate and graduate degrees from the same university.

The subjects received degrees from a diverse number of engineering schools. Thirteen of the thirty subjects received degrees from universities located in the state of Texas. The largest number of employees (five) received their degrees from the University of Texas-Arlington.

Research Question I

Research Question I sought to determine the number and

types of learning projects undertaken each year by engineers with degrees between the ages of 25 and 35. The twelve-month period immediately preceding the interview, August, 1979 through July, 1980, was used as a basis for collecting the data for this question. All of the subjects were actively involved in pursuing learning projects. The least number undertaken by any subject was six, while the largest number was twenty-three. Table VI indicates the number of learning projects undertaken by each subject.

TABLE VI

NUMBER OF LEARNING PROJECTS UNDERTAKEN BY SUBJECTS
(N=30)

Number of Learning Projects Undertaken	Number of Interviewees
1	0
2	0
3	0
4	0
5	0
6	1
7	0
8	1
9	9
10	2
11	3
12	2
13	1
14	3
15	0
16	3
17	1
18	1
19	2
20	0
21	0
22	0
23	1

The mean number of learning projects undertaken by the subjects was 12.4, with a mode of 9 and a range of 17.

The information was classified according to a topology suggested by Johnstone and Rivera (2). Two of their categories, agriculture and miscellaneous subject matter, were deleted. The remaining categories--(1) vocational or work-related, (2) recreational or hobby oriented, (3) current events, (4) home and family, (5) personal development, (6) academic or general education, and (7) religious--had also been used by other researchers (1,3). Each learning project was easily coded into one of the seven categories. Table VII shows the total number of learning projects in each category.

TABLE VII
TYPE OF LEARNING PROJECTS UNDERTAKEN BY SUBJECTS
(N=371)

Type of Learning Project	Number of Learning Projects	Percentage of Total Learning Projects
Vocational	114	30.7
Hobbies and Recreation	54	14.6
Current Events	28	7.5
Home and Family Life	98	26.4
Personal Development	60	16.2
Academic and General Education	3	.8
Religious	14	3.8

Vocational Learning Projects

The vocational category contained 114 learning projects, or 30.7 per cent of the total learning projects undertaken by the group, and each of the subjects undertook at least one learning project that was categorized as vocational in nature. This category was comprised of those projects that were determined to be job-related in any way or that were directly or indirectly related to the subject's professional or technical area. If it was determined during the course of the interview that the individual felt that the learning was job-related, or if the subject's intent in pursuing the learning project was determined to be job-related, then it was counted as vocational. An example of the individual's intent becoming a part of the criteria for categorizing the learning project would be the subject who studied the industrial applications of mathematics. The subject had decided that his current job required him to be able to apply certain mathematical principles to it. The subject had taken courses in mathematics as an undergraduate engineering student but was having some difficulty translating the theoretical principles involved to the practical applications called for in his job. The subject proceeded to find his college textbooks from his math courses and studied them, seeking to develop an understanding of the application of the theoretical principles as they related to his current job. The learning project was, therefore, categorized as

vocational. However, the same content would have been categorized as academic had the subject enrolled in a credit class that covered the same material. Examples of the types of learning projects included in the vocational category were related to micro-computers, effective report writing, programming, aircraft design, technical presentations, fracture mechanics, mechanical systems, new developments in aviation, electromagnetic fields, graphite composite technology, and aircraft industry vocabulary.

One individual spent an estimated 225 hours learning about new technology that affected the aerospace industry. He felt that it was important to remain abreast of any new developments relating to his job so that he could remain current and up-to-date within his vocational specialty. He remained current by reading books and professional journals, as well as through discussions with co-workers and consultants and through professional associations. It should be noted that in this example the person's motivation related to his work and profession and thus was categorized as vocational, as opposed to the current events category in which current events unrelated to an individual's vocation were recorded.

Hobbies and Recreation

Hobbies and recreation covered a wide variety of topics. Over 80 per cent of the subjects had at least one

learning project devoted to this category. Examples of learning projects included in this category were playing the piano, the planet Jupiter and its moons, dancing, Texas history, aviation history, bridge, cooking, playing the guitar, general history, and using a sextant.

One subject spent an estimated eighty-five hours pursuing a learning project that would enable him to use a sextant. He had obtained an inexpensive one from a friend and became intrigued with it, which led to reading about the background and early use of the sextant. He was then able to locate individuals who were knowledgeable in the use of a sextant, and they assisted him in obtaining some degree of proficiency in using it. After the subject felt he could use the sextant, he then purchased an expensive one made of brass. He was currently looking for old sextants to purchase in order to start a collection. The individual felt that he had mastered the use of the sextant and he expressed a great deal of personal satisfaction with this learning project.

Current Events

Two-thirds of the subjects were or had been involved in at least one current events type project during the preceding twelve months. One of the subjects had spent an estimated eighty hours on a learning project that was focused on the current Iranian political crisis. The

individual wanted to gain a better understanding of the causes leading up to the present turmoil in Iran and so undertook a learning project that would provide a clearer understanding.

Other examples of learning projects classified as current events included understanding the political candidates, the impact of national politics on the individual's life, understanding the nuclear power issue, and understanding the nuclear strategic policy of the United States. The subjects frequently mentioned that they wanted to become better informed of current events so that the information they had gained could be used to make the most intelligent voting response possible.

Home and Family Life

Learning projects that were related to home and family life were undertaken by 93.3 per cent of the subjects. It comprised the second largest number of learning projects undertaken by the sample, with a total of ninety-eight individual learning projects. This was expected, due to the age range of the subjects (25-35 years of age). Interest in adapting to marriage was expressed by many of the subjects. While twenty-two of the subjects were married, it appeared that the marriage was recent and that they were concerned about making the marriage work. Topics in this area included raising children, insurance, human personality,

marriage, and buying a house.

One individual who had been married less than two years spent an estimated thirty-six hours helping his wife learn about educational theory. His wife was working toward a degree in education, and while the subject did not have a background in education, he learned enough to assist his wife.

Personal Development

Personal development learning projects were undertaken by twenty-five, or 83.3 per cent, of the subjects. Examples of the types of learning projects in this category included speedreading, personal investing, understanding the commodity market, understanding the responsibilities of being a club officer, vocabulary building, German, French, and buying land. A large number of these learning projects involved the broad area of financial planning, where the individual was learning how to invest and manage his finances.

The subjects appeared to take these, as with all learning projects, seriously. One individual had spent 300 hours learning about investments. He related that he had developed a mathematical model of the stock market and a system for investing that worked for him. To back this up, he mentioned that during the current year he had made more money from the stock market than he had received from his employer in salary.

Academic and General Education

Only three, or 10 per cent, of the subjects had undertaken a learning project that involved academic credit. These three individuals had taken graduate classes in engineering from Southern Methodist University. The subjects had taken the graduate classes at the General Dynamics facility over a closed circuit television network. Each had made no more than two trips to the Southern Methodist University campus during the course of the semester. Each mentioned the convenience of being able to take the course at General Dynamics as opposed to driving to Dallas each week as the major reason for their decision to enroll in the class.

Religion

Religious learning projects accounted for fourteen, or 3.8 per cent, of the total learning projects undertaken by the sample. Twelve engineers related learning projects that were religious in nature. The projects primarily centered around Bible study. An example of a learning project that was categorized as religious revolved around a seventy-two-hour undertaking by one of the subjects that focused on studying the Bible and attention to other spiritual matters. The subject stated that this learning project was a continuation of learning projects that extended well into the past.

Summary

All of the subjects had undertaken a minimum of six learning projects during the preceding twelve months. The types varied, but all the subjects undertook at least one that was vocational or work-related. The largest number of work-related learning projects was 7, with a mean number of 3.8 for the entire group. Table VIII reveals the number of engineers involved in each category, the percentage of subjects, the range of learning projects, and the mean number for those subjects pursuing a learning project in each category.

TABLE VIII
TYPES OF SUBJECT MATTER UNDERTAKEN
BY SUBJECTS

Category	Number of Engineers	Per Cent of Engineers	Range	Mean
Vocational	30	100.0	1-7	3.80
Hobbies and Recreation	25	83.3	0-5	1.80
Current Events	20	66.6	0-2	0.93
Home and Family	28	93.3	0-11	3.30
Personal Development	25	83.3	0-6	2.00
Academic and General Education	3	10.0	0-1	0.10
Religion	12	40.0	0-2	0.47

Research Question II

Research Question II sought to determine the number of hours spent by the subjects on each learning project. This research question will be examined from two perspectives: the number of individual learning projects, and the total number of hours devoted to them. There was a wide range in the number of hours devoted to learning projects, from 495 to 4,325 hours, for a range of 3,830 hours. Table IX provides a summary of the total hours of participation in learning projects.

TABLE IX
TOTAL HOURS OF PARTICIPATION IN
ALL LEARNING PROJECTS
(N=30)

Number of Hours	Number of Subjects	Number of Hours	Number of Subjects
0-99	0	1600-1699	2
100-199	0	1700-1799	0
200-299	0	1800-1899	1
300-399	0	1900-1999	1
400-499	1	2000-2099	1
500-599	1	2100-2199	0
600-699	2	2200-2299	2
700-799	1	2300-2399	0
800-899	1	2400-2499	0
900-999	1	2500-2599	1
1000-1099	2	2600-2699	0
1100-1199	1	2700-2799	4
1200-1299	2	2800-2899	1
1300-1399	1	2900-2999	0
1400-1499	1	3000-3099	0
1500-1599	2	4300-4399*	1

*Note change in class interval sequence.

Seven, or 23.3 per cent, of the subjects devoted less than 1,000 hours during the preceding twelve months to learning projects, while ten, or one-third, invested over 2,000 hours. A clear perspective of the extent of learning efforts is obtained by viewing the total estimated time devoted to pursuing learning projects by each subject. During the twelve months prior to the study, the thirty engineers invested a total of 51,062 hours in 371 learning projects. Table X depicts the total hours spent on learning projects by each subject, as well as the total projects undertaken, and the mean hours spent on each learning project.

TABLE X

TOTAL HOURS SPENT PURSUING ALL LEARNING
PROJECTS FOR EACH SUBJECT

Subject	Total Hours Spent Pursuing Learning Project	Total Learning Projects Pursued	Mean Hours Per Learning Project
1	1,679	16	104.9
2	1,228	9	136.4
3	1,422	14	101.6
4	2,785	23	121.1
5	674	9	74.9
6	1,670	9	185.6
7	1,217	12	101.4
8	4,325	14	308.9
9	556	9	61.8
10	2,790	16	174.4
11	1,030	8	128.8
12	621	10	62.1
13	1,185	11	107.7
14	908	6	151.3
15	760	9	84.4
16	2,081	9	231.2
17	1,552	19	81.7

TABLE X--Continued

Subject	Total Hours Spent Pursuing Learning Projects	Total Learning Projects Pursued	Mean Hours Per Learning Project
18	1,575	14	112.5
19	2,784	19	146.5
20	825	10	82.5
21	1,957	11	177.9
22	495	9	55.0
23	2,294	18	127.4
24	2,750	9	305.5
25	2,560	12	213.3
26	1,380	11	125.5
27	1,802	17	106.0
28	2,890	13	222.3
29	2,219	16	138.7
30	1,048	9	116.4
Total	51,062	371	137.6

The median number of hours devoted to all learning projects by the subjects was 1,543.5, and the mean number of hours was 1,702.1. All engineers interviewed had participated in at least six learning projects during the preceding twelve-month period. The range was from 6 to 23, with a mean of 12.4. The mode number of projects was 9, while the median was 10.7. There was a total of 371 individual learning projects undertaken by the thirty engineers. The mean number of hours spent pursuing each of the learning projects was 137.6 with a range of 1,492 hours, running from a minimum of 8 hours to a maximum of 1,500 hours per learning project. The median was 50.5 hours. Table XI depicts the mean length of all learning projects undertaken by each of

the engineers.

TABLE XI
MEAN LENGTH OF TIME SPENT PURSUING LEARNING
PROJECTS BY SUBJECTS

Mean Length of Learning Projects (in hours)	Number of Subjects	Per Cent of Subjects
8-50*	0	0.0
51-100	7	23.3
101-150	14	46.6
151-200	4	13.3
201-250	3	10.0
251-300	0	0.0
301-350	2	6.6

*To obtain the mean length of each individual's learning projects, their total participation, in hours, was divided by the number of their projects.

Seven, or 23.3 per cent, of the subjects had a mean ranging between 51 and 100 hours for their individual learning projects, while two, or 6.7 per cent, had a mean between 301 and 350 hours for each learning project undertaken. The thirty engineers involved in the study indicated that they had participated in a total of 371 separate learning projects during the twelve-month period prior to the interview.

The mean number of hours per subject was 1,702.1 hours per year. In order to get a complete picture of how the subjects' time was spent, Table XII depicts the mean length of all learning projects.

TABLE XII
 MEAN LENGTH OF ALL LEARNING PROJECTS
 (N=371)

Hours	Total Learning Projects	Hours	Total Learning Projects
8-50	186	501-550	1
51-100	65	551-600	4
101-150	21	601-700*	1
151-200	29	701-800	5
201-250	13	801-900	0
251-300	10	901-1000	4
301-350	10	1101-1200	0
351-400	9	1201-1300	0
401-450	1	1301-1400	0
451-500	11	1401-1500	1

*Note change in class intervals

One hundred and eighty-six, or 50.1 per cent, of the 371 learning projects ranged from 8 to 50 hours, while .3 per cent were above 1,400 hours. The median number of hours devoted to all learning projects was 1,543.5; the mean number of hours was 1,702.1.

Research Question III

A list of the most frequent problems mentioned by adults when questioned about their learning projects was suggested by Tough (4). At the conclusion of each discussion, each subject was asked to complete a learning problems sheet. (See Appendix A.) This sheet contained twenty-one problems that Tough had identified as causing difficulties for individuals pursuing learning projects. Each subject was asked

to check a space if the item had caused a problem. A sheet was completed for each of the 371 learning projects. The range for the subjects ran from no problems to as many as thirteen. Table XIII presents the total number of problems for each of the 371 learning projects. Each of the twenty-one problems identified by Tough was cited in at least thirteen of the learning projects. Deciding about time was a problem in over one-third (36.4 per cent) of the 371 learning projects.

TABLE XIII

TOTAL PROBLEMS ENCOUNTERED FOR ALL
371 LEARNING PROJECTS

Problem	Total Number of Times Problem Was Encountered
Deciding about time (how much time to spend and when to spend it)	135
Obtaining resources (books, persons, or other resources)	97
Deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill .	96
Deciding what knowledge or skills you wanted to learn	90
Applying the knowledge in real life situations . .	81
Estimating your level of knowledge or skill . . .	79
Deciding about money	79
Overcoming laziness or inertia	75
Dealing with difficult parts	73
Dealing with the frustration that arises when learning about an area of knowledge that contains	

TABLE XIII--Continued

Problem	Total Number of Times Problem Was Encountered
only issues and opinions and policy positions, not clear-cut answers	70
Dealing with doubts about success	62
Dealing with a lack of the fundamental knowledge necessary to begin a project. Before beginning to learn about economics, for example, it might be necessary to learn certain principles and proce- dures in mathematics	62
Developing, regaining, or maintaining certain learning skills, such as concentrating, under- standing new material, and remembering	60
Dealing with dislike for the activity (reading, practicing, or whatever)	50
Finding and joining one or more fellow learners or experts who can provide companionship, stimula- tion, and encouragement	40
Persuading one or more individuals to cooperate with the project, or at least to refrain from blocking it. For example, it might be necessary to persuade an individual to cooperate with certain physical arrangements, or to alter the time at which something is done (eating dinner, for example), or to give up some time with the self-teacher, or otherwise make fewer demands on his time	36
Dealing with a lack of desire for achieving your goal after you began the project	29
Deciding whether to continue	29
Dealing with (or avoiding) unpleasant physical consequences of the learning, such as the smell after practicing a new recipe, or aching muscles after practicing tennis	26
Dealing with the problem of being "slowed down" or frustrated by a fellow learner	13
Deciding about a place to learn	13
Total	1,295

There were a total of 1,295 problems checked on the learning problems list for the 371 learning projects undertaken by the subjects. This resulted in a mean of 3.49 learning problems for each learning project. The five most frequently mentioned problems were (1) deciding about time (how much time to spend and when to spend it); (2) obtaining resources (books, persons, or other resources); (3) deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill; (4) deciding what knowledge or skills the subject wanted to learn; and (5) applying the knowledge in real life situations.

The learning projects that were categorized as vocational experienced a mean of 3.5 problems for each learning project. The five most frequently mentioned problems were (1) deciding about time (how much time to spend and when to spend it); (2) developing, regaining, or maintaining certain learning skills, such as concentrating, understanding new material, and remembering; (3) deciding what knowledge or skills they wanted to learn; (4) deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill; and (5) dealing with difficult parts. Appendix G, Table XVIII notes all the learning problems encountered with vocational learning projects.

The learning projects that were categorized as hobbies

or recreational had a mean of 2.4 problems associated with each learning project. The five most frequently mentioned problems were (1) deciding about time (how much time to spend and when to spend it); (2) obtaining resources (books, persons, or other resources); (3) finding and joining one or more fellow learners or experts who could provide companionship, stimulation, and encouragement; (4) deciding about money; and (5) deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill. A complete list of all problems encountered with hobby and recreational learning projects is found in Appendix G, Table XIX.

The learning projects that were categorized as current events had a mean of 3.1 problems related to each learning project. The five most frequently mentioned problems were (1) dealing with the frustration that arises when learning about an area of knowledge that contains only issues and opinions and policy positions, not clear-cut answers; (2) applying the knowledge in real life situations; (3) deciding about time (how much time to spend and when to spend it); (4) deciding what knowledge or skills you wanted to learn; and (5) deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill. A complete list of all the problems encountered with current events learning problems is found in Appendix G, Table XX.

The learning projects that fell in the home and family life category experienced a mean of 4.1 problems for each learning project. The five most frequently encountered learning problems were (1) deciding about money; (2) obtaining resources (books, persons, or other resources); (3) deciding about time (how much time to spend and when to spend it); (4) deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill; and (5) applying the knowledge in real life situations. Appendix G, Table XXI provides a list of all the problems encountered and the frequency of each problem.

The learning projects that were categorized as personal development experienced a mean of 3.9 problems for each learning project. The five most frequently mentioned problems were (1) deciding about time (how much time to spend and when to spend it); (2) obtaining resources (books, persons, or other resources); (3) deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill; (4) deciding about money; and (5) deciding what knowledge or skills they wanted to learn. Appendix G, Table XXII provides a complete picture of all the problems encountered with personal development learning projects.

The learning projects that were categorized as academic and general education had a mean of 1.3 problems per learning

project. There were three engineers who undertook a learning project in this category. There were only four learning problems encountered by the three individuals, and each of the four problems was noted only one time. The four problems encountered were (1) deciding about time (how much time to spend and when to spend it; (2) dealing with dislike for the activity (reading, practicing, or whatever); (3) dealing with a lack of the fundamental knowledge necessary to begin a project (before beginning to learn about economics, for example, it might be necessary to learn certain principles and procedures in mathematics); and (4) overcoming "laziness" or inertia. Appendix G, Table XXIII provides a description of all the responses received.

The learning projects categorized as religious experienced a mean of 3.5 learning problems per learning project. In this section, four problems received the same frequency of responses as the problem ranked as number four, so that in order to describe the five most frequently mentioned problems, it became necessary to view seven separate problems. The learning problems encountered most frequently were (1) deciding about time (how much time to spend and when to spend it); (2) deciding what knowledge or skills they wanted to learn; (3) developing, regaining, or maintaining certain learning skills, such as concentrating, understanding new material, and remembering; (4) dealing with doubts about success; (5) dealing with the frustration

that arises when learning about an area of knowledge that contains only issues and opinions and policy positions, not clear-cut answers; (6) applying the knowledge in real life situations; and (7) finding and joining one or more fellow learners or experts who can provide companionship, stimulation, and encouragement. (The last four problems listed were each checked four times.) A complete list of all the problems encountered is found in Appendix G, Table XXIV.

The mean number of problems encountered with each learning project by each subject was 3.49. This indicates that a variety of problems are associated with the learning projects but that the subjects have enough desire to overcome the problems and continue the learning projects. The most frequently mentioned problems were (1) deciding about time, (2) obtaining the necessary resources, (3) deciding which activities are necessary in order to learn the knowledge, (4) deciding what knowledge or skills they wanted to learn, and (5) applying the knowledge in their personal situations. Dealing with being slowed down by a fellow learner and deciding about a place to learn were mentioned the least.

Research Question IV

Research Question IV was to determine whether a majority of learning projects undertaken by the subjects were job-related. Job-related learning projects contained the

largest number of learning projects, 114, or 30.7 per cent, followed by home and family life learning projects, with 98, or 26.4 per cent. Personal development learning projects numbered 60, or 16.2 per cent, while current events had 28 learning projects for 7.5 per cent of the learning projects. Religious learning projects numbered 14, or 3.8 per cent, with academic and general education containing 3 learning projects, or .8 per cent. Table XIV depicts this information.

TABLE XIV
TYPE OF LEARNING PROJECTS UNDERTAKEN
BY SUBJECTS

Type of Project	Total Number of Projects	Per Cent of Total Projects	Total Hours	Per Cent of Total Hours Devoted to Learning Projects by Employees	Mean Hours Per Type of Project
Vocational	114	30.7	24,465	47.9	214.6
Hobbies and Recreation	54	14.6	5,207	10.2	96.4
Current Events	28	7.5	6,199	12.1	221.4
Home and Family Life	98	26.4	6,259	12.3	63.9
Personal Development	60	16.2	4,800	9.4	80.0

TABLE XIV--Continued

Type of Project	Total Number of Projects	Per Cent of Total Projects	Total Hours	Per Cent of Total Hours Devoted to Learning Projects by Employees	Mean Hours Per Type of Project
Academic and General Education	3	.8	1,750	3.4	583.3
Religious	14	3.8	2,382	4.7	170.1
Total	371	100.0	51,062	100.0	137.6

Research Question V

Research Question V was to determine what resources the subjects used in pursuing their learning projects. A list of resources people use to learn was developed that contained twenty-five specific items and an additional response entitled "Other" that was designed to elicit any resource used not mentioned in the first twenty-five responses. After each learning project was discussed with each subject, the subjects were asked to respond with the learning resources sheet (see Appendix D), indicating what resources were used while pursuing the individual learning projects. Each resource was followed by a line which enabled the subjects to place a check mark after any resources they had

used in pursuing their individual learning projects.

Item twenty-six on the list contained the response Other and was checked in 51 out of the 371 learning projects. The responses indicated that in 34 cases newspapers were used, and in 17 cases relatives or acquaintances were used as a resource in pursuing their learning projects. Each of the subjects indicated that he had used at least one of the resources listed on the learning resources sheet, and one of the subjects used as many as fourteen resources in pursuing an individual learning project. The mean number of learning resources for the 371 learning projects was 4.3 per learning project. Table XV lists the frequency that each was used for the 371 learning projects.

TABLE XV
TOTAL RESOURCES USED FOR ALL LEARNING PROJECTS

Resource Used	Rank Order	Total Number of Times Utilized
Books	1	260
A friend	2	194
Magazines	3	184
An individual who is considered an expert in the area	4	145
Peers or co-workers	5	130
A group comprised of individuals with the same interest	6	122

TABLE XV--Continued

Resource Used	Rank Order	Total Number of Times Utilized
Boss or supervisor	7	66
TV program	8	65
Meeting	9	55
Other	10	51
Lecture	11	42
Professional associations	12	42
Government periodicals	13	41
Consultants	14	39
Noncredit classes	15	29
Workshop, conference, etc.	16	27
Films or movies	17	26
Case studies	18	26
Programmed instruction	19	18
Videotape	20	15
Filmstrips	21	6
Slides	22	6
Simulation game	23	5
Audio cassettes	24	4
Credit classes	25	3
Correspondence study	26	2
Total	...	1,603

The resources most frequently used by the subjects were books, friends, magazines, an individual who is considered an expert in the subject area, and peers or co-workers. Appendix H, Tables XXV, XXVI, XXVII, XXVIII, XXIX, XXX, and XXXI contain the resources used by the subjects in pursuing each of the seven categories.

It should be noted that the utilization of learning resources varies, based on the category of the learning project. Vocational learning projects utilized (1) books, (2) peers and co-workers, (3) an individual who is considered an expert in the area, (4) a boss or supervisor, and (5) a group comprised of individuals with the same interest as the five most frequently used resources. The subjects utilized a mean of 5.3 separate resources in pursuing vocational learning projects. A complete list of all resources used is found in Appendix H, Table XXV. Learning resources used in pursuing learning projects related to hobbies and recreation had a mean of 3.8 individual resources. The subjects used (1) friends, (2) books, (3) magazines, (4) groups comprised of individuals with the same interest, and (5) individuals who were considered to be an expert in the area as the five most frequently used resources. Appendix H, Table XXVI provides a complete list of all resources used.

The current events category had a mean of 4.3 learning resources utilized for each learning project undertaken by the subjects. The five most frequently used learning

resources included (1) TV programs; (2) magazines; (3) other resources not listed on the learning resources sheet, such as radio and newspapers; (4) books; and (5) friends. A complete description of all the learning resources used for current events learning projects is found in Appendix H, Table XXVII. Learning projects classified as home and family related utilized a mean of 3.9 learning resources for each learning project undertaken. The five most frequently used resources were (1) friends, (2) books, (3) magazines, (4) individuals who are considered to be experts in the subject area, and (5) peers and co-workers and the other resources, which were both used twenty-seven times. Appendix H, Table XXVIII fully describes the resources utilized.

The personal development learning projects category used a mean of 3.5 learning resources for each learning project. The five most frequently used learning resources were (1) books, (2) friends, (3) magazines, (4) individuals considered to be experts in the area, and (5) peers and co-workers. A complete description of the resources utilized can be found in Appendix H, Table XXIX.

The resources utilized by the subjects in pursuing learning projects categorized as academic and general education in nature had a mean of 4.3 resources for each learning project. In this category, three, or 10 per cent, of the subjects enrolled in a credit class while pursuing a graduate program. These individuals indicated credit classes,

books, friends, and an individual considered to be an expert in the area as the learning resources that they used. Appendix H, Table XXX provides this information.

The final category, religion, utilized a mean of 4.6 learning resources for each learning project reported. The five most frequently used resources were (1) books, (2) friends, (3) groups comprised of individuals with the same interest, (4) individuals considered to be experts in the area, and (5) lectures. Appendix H, Table XXXI provides a complete listing of all learning resources utilized in pursuing religious learning projects.

The learning projects that were vocational or work-related used the most resources, with a mean of 5.3 resources for each learning project. Learning projects that were religious in nature followed with a mean of 4.6 resources used for each learning project, current events and academic and general education learning projects used a mean of 4.3 resources for each project, hobbies and recreation and home and family learning projects each had a mean of 3.9 resources for each learning project, while personal development learning projects used the least number of resources, with a mean of 3.5 resources for each project.

The mean number of resources utilized by each subject indicates that the subjects were rather sophisticated in approaching their learning projects. They knew where to turn for resources and used them. Books, friends, magazines,

experts, and peers or co-workers were the most commonly used resources, while audio cassettes and correspondence study were the least mentioned. Item twenty-six, Other, drew responses of newspapers and relatives or acquaintances.

Research Question VI

Research Question VI determined that subjects preferred to pursue their learning projects in their homes. The home was the preferred location over all others--162 of the 371 learning projects, or 43.7 per cent, were conducted in the individuals' homes. Table XVI notes the locations and the percentage of learning projects that took place in each.

TABLE XVI
LOCATION WHERE LEARNING PROJECT TOOK PLACE

Location	Number of Learning Projects	Percentage of Learning Projects
Home	162	43.7
Work	84	22.6
Library	4	1.1
School	3	0.8
Other	44	11.9
Combination	74	19.9
Total	371	100.0

The work place was the site used for eighty-four of the learning projects, while seventy-four took place in a combination of locations. Table XVII examines the data based on the type of learning project.

TABLE XVII
 LOCATION USED FOR EACH TYPE OF LEARNING PROJECT
 (N-371)

Location	Vocational		Hobbies and Recreation		Current Events		Home and Family		Personal Development		Academic and General Education		Religious	
	No.*	%*	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Home	14	12.3	25	46.3	36	52.9	75	76.5	29	48.3	0	0.0	2	14.3
Work	77	67.5	1	1.9	5	7.4	1	1.0	4	6.7	0	0.0	0	0.0
Library	0	0.0	1	1.9	3	4.4	0	0.0	2	3.3	0	0.0	0	0.0
School	0	0.0	0	0.0	0	0.0	0	0.0	1	1.7	2	66.7	4	28.6
Other	10	8.8	15	27.7	4	5.9	7	7.2	6	10.0	1	33.3	0	0.0
Combina- tion	13	11.4	12	22.2	20	29.4	15	15.3	18	30.0	0	0.0	8	57.1
Total	114	100.0	54	100.0	68	100.0	98	100.0	60	100.0	3	100.0	14	100.0

* No., Number; %, Per Cent.

Table XVIII points out that only 12.3 per cent of the work-related learning projects took place in the home, while 67.5 per cent took place in the work setting. This contrasts with the learning projects that were categorized as home and family related, where a large majority (76.5 per cent) of the learning projects were conducted in the individual's home and only 1 per cent was conducted in the work setting.

Research Question VII

Research Question VII sought to determine whether the learning projects are amenable to assistance by employers. The data revealed that a considerable amount of time (24,465 hours) was devoted to learning projects that were categorized as vocational or work-related in nature. The mean number of hours invested in learning projects that were vocational or work-related was 815.5 hours by each subject. Each of the subjects undertook at least one vocational or work-related learning project, and seven vocational or work-related learning projects was the maximum undertaken by any subject. The mean number of vocational or work-related learning projects undertaken by the subjects was 3.8. The subjects' vocational or work-related learning projects had a mean of 214.6 hours devoted to each of the 114 learning projects.

While a majority (67.5 per cent) of the learning projects that were categorized as vocational or work-related took place at the subject's place of employment, 32.5 per

cent of the learning projects undertaken by the subjects took place at other locations or a combination of locations. In addition, during the course of some interviews, subjects mentioned that they preferred to stay at work after normal working hours in order to continue or start some learning projects, because it was quiet or because resources were available for them to use. This information was not recorded but is introduced so that the reader can appreciate the fact that while 67.5 per cent of the vocational or work-related learning projects occurred at the individual's place of employment, it does not follow that the learning project took place during the employee's normally scheduled working hours.

The two major areas that are amenable to assistance by employers revolve around resources used by the employees and the problems encountered by the employees while pursuing vocational or work-related learning projects. The subjects used a mean of 5.3 resources for each vocational or work-related learning project undertaken. The most frequently used resources included books (in eighty-seven cases), peers or co-workers (seventy-five times), experts (fifty-six learning projects), the subject's boss or supervisor (fifty-four cases), a group comprised of individuals with the same interest (forty-nine times), and magazines (forty-one learning projects). In addition, 244 other resources were reported as used by the subjects while pursuing vocational

or work-related learning projects. In twenty-three vocational or work-related learning projects, the subjects stated that obtaining resources caused a problem.

The subjects reported that they experienced a mean of 3.5 problems with each vocational or work-related learning project they undertook. The most frequently mentioned problems included deciding about time (how much time to spend and when to spend it) (forty-two learning projects); developing, regaining, or maintaining certain learning skills, such as concentrating, understanding new material, and remembering (thirty-six learning projects); deciding what knowledge or skills they wanted to learn (thirty-four learning projects); deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill (thirty-three learning projects); and dealing with difficult parts (thirty-two learning projects). In addition, 244 other learning problems were reported by the subjects.

Summary

This study investigated the learning projects pursued by engineers between the ages of 25 and 35 and employed by a single employer engaged in the aerospace industry. The data were collected through the use of an extensive interview schedule patterned after that used by Tough. The study addressed questions dealing with the number and types of

learning projects undertaken by the subjects, the number of hours the subjects devoted to the learning projects, the problems encountered by the subjects in pursuing learning projects, the job-related learning projects undertaken by the subjects, the resources used by the subjects in pursuing learning projects, and if the learning projects are amenable to assistance by employers.

CHAPTER BIBLIOGRAPHY

1. Johns, W. E., "Selected Characteristics of the Learning Projects Pursued by Practicing Pharmacists," unpublished doctoral dissertation, Department of Education, University of Georgia, Athens, Georgia, 1973.
2. Johnstone, John W. C., and Rivera, Ramon J., Volunteers for Learning, Chicago, Aldine Publishing Company, 1965.
3. McCatty, C., "Patterns of Learning Projects among Professional Men," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1973.
4. Tough, Allen, Learning Without a Teacher: A Study of Tasks and Assistance During Adult Self-Teaching Projects, Toronto, Canada, Ontario Institute for Studies in Education, 1969.

CHAPTER V

SUMMARY OF FINDINGS, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

This study was undertaken to investigate the learning projects of degreed engineers between the ages of 25 and 35 employed in the Research and Engineering Department of the Fort Worth Division of General Dynamics. This chapter presents a summary of the results, conclusions derived from the study, implications suggested by the results, and recommendations for further study.

The thirty subjects of this study were employed full time as engineers in the Research and Engineering Department of the Fort Worth Division of General Dynamics. All the subjects had as a minimum a Bachelor's degree in Aerospace Engineering, Mechanical Engineering, Electrical Engineering, or Civil Engineering. Twenty-two of the subjects had attained a Bachelor's degree, seven a Master of Science degree, and one had received the Doctor of Philosophy degree. The thirty subjects were each interviewed using a probing interview in order to examine the learning projects they had undertaken during the preceding twelve months. Each interview was conducted during normal working hours and held in the Research and Engineering Department of the Fort Worth

Division of General Dynamics. These interviews were conducted during the month of July 1980, and the mean length of each interview was one hour and forty-three minutes.

The data collected were examined in order to provide descriptive information relating to the numbers and types of learning projects undertaken by the subjects, the number of hours spent by the subjects on each learning project, the problems the subjects experienced while pursuing their learning projects, the number of job-related learning projects undertaken, the preferences for resources used in pursuing learning projects, the locations used by the subjects to pursue their learning projects, and to determine if there was any way employers could assist employees in pursuing learning projects.

Summary of Findings

The first research question investigated by this study sought to determine the number and types of learning projects undertaken each year by engineers with degrees and between the ages of 25 and 35. The total number of learning projects undertaken by the entire group was 371. The mean number of learning projects undertaken by each subject during the preceding twelve months was 12.4, with a mode of 9 and a range of 17. Vocational or work-related learning projects were undertaken by all thirty of the subjects, and this was the only category of learning projects undertaken

by each of the subjects. This category had a mean of 3.8 and a range of 6. Learning projects categorized as home and family were the next most popular, with twenty-eight, or 93.3 per cent of the subjects undertaking at least one home and family learning project. This category had a mean of 3.3 and a range of 0-11. Personal development learning projects were undertaken by 83.3 per cent of the engineers. Personal development learning projects had a mean of 2.0 per subject and a range of 0-6, while hobbies and recreation learning projects accounted for a mean of 1.8 per subject with a range spanning from 0-5, and were undertaken by 83.3 per cent of the subjects. The current events category included learning projects undertaken by twenty, or 66.6 per cent of the subjects. This category had a mean of .93 learning projects for all the subjects with a range spanning from 0-2. Religious learning projects were undertaken by twelve, or 40 per cent of the engineers. The mean was .47 with a range of 0-2 learning projects per engineer. The learning projects that were academic or general education in nature represented the least used category of learning projects undertaken by the subjects, with 10 per cent of the subjects undertaking learning projects categorized as academic or general education. The mean was .1 per subject with a range of 1 (0-1).

Research Question II sought to determine the number of hours spent by the subjects on each learning project. A

total of 51,062 hours was spent by the subjects while pursuing a total of 371 learning projects. The mean number of hours devoted to learning projects by each of the subjects was 1,702.1 hours, while the range spanned from 495 hours to 4,325 hours for each subject's total learning projects. Each of the 371 learning projects undertaken by the subjects amounted to a mean of 137.6 hours, with a range that spanned from 8 hours to 1,500 hours for each learning project.

Research Question III sought to determine the problems experienced by the subjects while pursuing their learning projects. It was found that the five most frequently mentioned problems were (1) deciding about time (how much time to spend and when to spend it); (2) obtaining resources (books, persons, or other resources); (3) deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skills they wanted to learn; (4) deciding what knowledge or skills they wanted to learn; and (5) applying the knowledge in real life situations.

There was some variation in the learning problems encountered in each of the seven categories used to classify the learning projects. The five most frequently mentioned learning problems encountered while pursuing learning projects that were vocational or work-related were (1) deciding about time (how much time to spend and when to spend it); (2) developing, regaining, or maintaining certain learning

skills, such as concentrating, understanding new material, and remembering; (3) deciding what knowledge or skills they wanted to learn; (4) deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill; and (5) dealing with difficult parts.

The five most frequently mentioned problems encountered by the subjects while pursuing hobbies and recreational learning projects were (1) deciding about time (how much time to spend and when to spend it); (2) obtaining resources (books, persons, or other resources); (3) finding and joining one or more fellow learners or experts who could provide companionship, stimulation, and encouragement; (4) deciding about money; and (5) deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill.

The five most frequently listed problems experienced by the subjects pursuing current events learning projects were (1) dealing with the frustration that arises when learning about an area of knowledge that contains only issues and opinions and policy positions, not clear-cut answers; (2) applying the knowledge in real life situations; (3) deciding about time (how much time to spend and when to spend it); (4) deciding what knowledge or skills they wanted to learn; and (5) deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn

the desired knowledge or skill.

The five most frequently listed learning problems encountered by the subjects pursuing home and family learning projects were (1) deciding about money; (2) obtaining resources (books, persons, or other resources); (3) deciding about time (how much time to spend and when to spend it); (4) deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill; and (5) applying the knowledge in real life situations. The five most frequently encountered learning problems encountered by the subjects while pursuing learning projects that were categorized as personal development were (1) deciding about time (how much time to spend and when to spend it); (2) obtaining resources (books, persons, or other resources); (3) deciding which activities (such as reading certain books or observing certain things) were necessary in order to learn the desired knowledge or skill; (4) deciding about money; and (5) deciding what knowledge or skills they wanted to learn.

Only four learning problems were encountered by subjects pursuing academic or general education learning projects--(1) deciding about time (how much time to spend and when to spend it); (2) dealing with dislike for the activity (reading, practicing, or whatever); (3) dealing with a lack of the fundamental knowledge necessary to begin a project (before beginning to learn about economics, for

example, it might be necessary to learn certain principles and procedures in mathematics); and (4) overcoming laziness or inertia.

The five most frequently encountered problems the subjects experienced while pursuing learning projects that were categorized as religious were (1) deciding about time (how much time to spend and when to spend it); (2) deciding what knowledge or skills they wanted to learn; (3) developing, regaining, or maintaining certain learning skills, such as concentrating, understanding new material, and remembering; (4) dealing with doubts about success; and (5) dealing with the frustration that arises when learning about an area of knowledge that contains only issues and opinions and policy positions, not clear-cut answers. In addition, two other learning problems were encountered by the subjects the same number of times as the problems listed as number four and number five. These were (1) applying the knowledge in real life situations and (2) finding and joining one or more fellow learners or experts who could provide companionship, stimulation, and encouragement.

Research Question IV sought to determine whether a majority of learning projects undertaken by the subjects were job-related. Job-related learning projects accounted for the largest percentage of learning projects (30.7) undertaken by the subjects. Home and family life learning projects accounted for 26.4 per cent, personal development

16.2 per cent, current events 7.5 per cent, religious learning projects 3.8 per cent, and academic and general education accounted for .8 per cent of the learning projects undertaken by the subjects.

It was found that while the percentage of learning projects in each category reported provided an understanding of the categories of learning projects undertaken by the subjects, a more detailed understanding was obtained when each category of learning project was viewed in terms of the total hours devoted by the subjects. Thus, vocational or job-related learning projects rose from 30.7 per cent of the learning projects undertaken by the subjects to 47.9 per cent of the total hours devoted by the subjects to all learning projects. Home and family life declined from 26.4 per cent when viewed in terms of the percentage of all learning projects undertaken by all subjects to 12.3 per cent of all hours devoted to learning projects. Personal development learning projects declined from 16.2 per cent to 9.4 per cent, hobbies and recreation declined from 14.6 per cent to 10.2 per cent, current events increased from 7.5 per cent to 12.1 per cent, religious learning projects increased from 3.8 per cent to 4.7 per cent, and academic and general education learning projects increased from .8 per cent to 3.4 per cent of the total hours devoted to learning projects by the subjects when viewed in terms of percentage of learning projects undertaken by the subjects.

Research Question V sought to determine whether a majority of the subjects had a preference for certain learning resources. It was found that the five most commonly used resources were (1) books, (2) friends, (3) magazines or journals, (4) individuals considered to be experts, and (5) peers or co-workers. No data were available from similar studies for comparative purposes. There was variation in the use of resources based on the categories of learning projects. The five most frequently used learning resources for vocational or work-related learning projects were (1) books, (2) peers or co-workers, (3) an individual considered an expert in the area, (4) a boss or supervisor, and (5) a group comprised of individuals with the same interest. The five most frequently used learning resources used with learning projects categorized as hobbies and recreation were (1) friends, (2) books, (3) magazines, (4) a group comprised of individuals with the same interest, and (5) an individual who was considered an expert in the area. The five most frequently used learning resources used in current events learning projects were (1) TV programs, (2) magazines, (3) other resources (such as newspapers), (4) books, and (5) friends. Home and family learning projects used (1) friends, (2) books, (3) magazines, (4) individuals considered experts in the area, and (5) peers or co-workers. Learning projects categorized as personal development used (1) books, (2) friends, (3) magazines, (4) individuals considered experts

in the area, and (5) peers or co-workers as the five most frequently used learning resources. Learning projects categorized as academic or general education had only four learning resources that received multiple responses due to the small number (three) of learning projects undertaken. The four learning resources receiving multiple responses were (1) books, (2) credit classes, (3) friends, and (4) an individual considered an expert in the area. The five most frequently used resources with religious learning projects were (1) books, (2) friends, (3) a group comprised of individuals with the same interest, (4) an individual that was considered an expert in the area, and (5) lectures.

Research Question VI sought to determine whether a majority of the subjects prefer to pursue their learning project in their homes. It was determined that 43.7 per cent of the individuals' learning projects were conducted in their homes; 22.6 per cent were conducted at work; 19.9 per cent took place in a combination of locations; 11.9 per cent took place at a location other than the home, work, library, or school, such as an attorney's office; 1.1 per cent took place at a library; and .8 per cent took place at a school.

The locations used for each type of learning project varied from the data that was collected from all learning projects. The home was used in 12.3 per cent of the vocational or work-related learning projects, 46.3 per cent of the hobbies and recreation category, 52.9 per cent of the

current events learning projects, 76.5 per cent of the home and family learning projects, 48.3 per cent of the personal development learning projects, and 14.3 per cent of the religious learning projects. The home was not used for academic and general education learning projects.

Work was the location used for 67.5 per cent of the vocational or work-related learning projects, 1.9 per cent of the hobbies and recreation category, 7.4 per cent of the current events learning projects, 1.0 per cent of the home and family learning projects, 6.7 per cent of the personal development learning projects, and the work location was not used for any learning projects categorized as academic or general education or religious learning projects.

A library was used in 1.9 per cent of the hobbies and recreation learning projects, 4.4 per cent of the current events learning projects, and 3.3 per cent of the personal development learning projects. The library was not utilized for learning projects categorized as vocational or work-related, home and family, academic or general education, or religious.

A school was the major location used for 1.7 per cent of the learning projects categorized as personal development, 66.7 per cent of the academic or general education learning projects, and 28.6 per cent of the religious learning projects. A school was not utilized with any learning project categorized as vocational or work-related, hobbies

and recreation, current events, or home and family.

Locations other than those mentioned, such as a friend's home or an attorney's office, accounted for 8.8 per cent of the vocational or work-related learning projects, 27.7 per cent of those categorized as hobbies or recreation, 5.9 per cent of the current events learning projects, 7.2 per cent of the home and family learning projects, 10.0 per cent of the personal development learning projects, 33.3 per cent of the academic and general education learning projects, and were not used in any religious learning project.

A combination of two or more of the locations was used in 11.4 per cent of the vocational or work-related learning projects, 22.2 per cent of the hobbies or recreation learning projects, 29.4 per cent of the current events learning projects, 15.3 per cent of the home and family learning projects, 30.0 per cent of the personal development learning projects, 57.1 per cent of the religious learning projects, and was not utilized in the academic or general education learning projects.

Research Question VII sought to determine whether the learning projects are amenable to assistance by employers. The findings reveal that the learning resources used by the subjects while pursuing learning projects that were vocational or work-related represented the single largest mean number of resources utilized by the subjects in all the categories of learning projects. The most frequently used

resources included (1) books, (2) peers or co-workers, (3) experts, (4) the subject's boss or supervisor, and (5) a group comprised of individuals with the same interest. The findings also point out that the subjects encounter problems while pursuing vocational or work-related learning projects. The five most frequently mentioned problems encountered while pursuing vocational or work-related learning projects were (1) deciding about time (how much time to spend and when to spend it); (2) developing, regaining, or maintaining certain learning skills, such as concentrating, understanding new material, and remembering; (3) deciding what knowledge or skills they wanted to learn; (4) deciding which activities (such as reading certain books or observing certain things) were necessary to learn the desired knowledge or skill; and (5) dealing with difficult parts.

This suggests that employers can offer assistance to employees pursuing vocational or job-related learning projects by providing resources the employees can utilize while pursuing vocational or job-related learning projects, and also by providing assistance to employees who are experiencing problems while pursuing learning projects that are vocational or work-related.

Conclusions

The following conclusions are based on the findings of this study.

1. The number and types of learning projects undertaken by engineers in this sample are congruent with the theory in adult developmental psychology that young (aged 25-35) adults are primarily involved in career-related developmental tasks.
2. Vocational or job-related learning projects offer employers an opportunity to supplement the training programs provided employees.
3. The number of hours the engineers devoted to vocational or job-related learning projects indicates that employers who take advantage of this learning may increase productivity and reduce costs.
4. The subjects did not think in terms of the number of hours devoted to learning projects until they were given an understanding of learning projects; thus, there exists the possibility of error in the estimates given for the number of hours they spent pursuing the individual learning projects.
5. The subjects spent time overcoming learning problems and locating resources, thus reducing the total amount of time available to the content of the learning project.
6. The subjects were unaware of the amount of time they were devoting to learning projects.
7. The mean number of hours spent pursuing all learning projects by the subjects in the study

(engineers aged 25-35) was greater than other studies reported in the literature that have investigated the learning projects of adults.

8. Based on statements made by the subjects, employers or any agency could facilitate job-related learning projects by providing resources that are easily transportable.
9. The subjects in the study were serious enough about the learning projects they undertook to overcome or at least cope with the problems they encountered and locate the resources they needed, thus enabling them to complete or continue the learning projects.
10. The learning projects categorized as personal development suggest they may be of value to employers.
11. The interview instrument did not provide a definitive answer for Research Question VII.
12. The interview instrument was of value in probing and promoting recall but is questionable in terms of the reliability attached to the estimation of total hours devoted to each learning project.

Implications for Business and Industry

The population of engineers studied has shown a very high interest in pursuing learning projects. Employers of

degreed engineers should take note of the possibilities that exist for them to use this information to capitalize on the vocational or job-related learning projects undertaken by their employees. If one accepts the assumptions that whatever time employees spend pursuing vocational or job-related learning projects is of value to the employer and that any shift from the work setting to the employee's home as the location where the learning project takes place is desirable from the employer's point of view, then the following implications of this study merit consideration.

1. Should employers elect to provide easily transportable resources that employees can use while pursuing learning projects, then a portion of the learning projects that are undertaken at the employer's facility may shift to the employee's home, thus saving the employer salary costs incurred during the learning project.
2. Any assistance employers can provide through learning resources or through assisting employees to overcome any problems encountered while pursuing vocational or job-related learning projects can become a cost savings factor.
3. Any assistance employers can provide either through providing learning resources or assisting employees in overcoming learning problems should increase the number of hours devoted to learning projects.

4. This study may provide information that is generalizable to other occupational groups, thus enabling employers to consider the possible cost savings potential.
5. Employers should capitalize on the vocational or job-related learning employees are undertaking.
6. Employers should offer a Learning How to Learn course in their training program which provides employees with an understanding of learning projects, how to obtain resources, and how to overcome problems associated with learning projects.
7. By providing assistance in securing resources for employees and assisting employees in dealing with problems associated with vocational or job-related learning projects, employers can increase the number of hours employees devote to vocational or job-related learning projects.

Implications for Education

The findings of this study offer implications not only for business and industry but also for education.

1. Learning projects may provide insight in evaluating nontraditional learning.
2. Easily transportable learning resources provided by educational institutions ought to enhance students' undertaking of learning projects that can supplement

their regular studies.

3. Adults who are pursuing learning projects might be able to relate a learning project to a college or university credit course, thus qualifying to receive credit for the course.

Recommendations

On the basis of the findings and conclusions of this study, the following recommendations are made.

1. Further research is needed which compares each of the categories of learning projects to determine if a relationship exists with the learning project and the subjects' career advancement.
2. Research is needed that examines the effect of learning resources that are provided by employers.
3. A follow-up study should be conducted during July, 1981 to determine what changes, if any, have occurred in the subjects' learning projects.
4. Further research should be conducted with engineers between the ages of 25 and 35 who are employed with companies that are not associated with high technology, such as engineers employed by utility companies, state government highway departments, manufacturing firms, and transportation employers.
5. Research should be undertaken to determine if there is a relationship between the number of

hours devoted to learning projects and the employee's career advancement.

6. Research should be undertaken to determine if engineers employed in a nontechnical capacity such as general management devote as much or more time to learning as those engineers in technical fields. Also, the type of learning projects undertaken by engineers employed in a nontechnical field should be researched.
7. Research should be undertaken to determine if there is a relationship between the number of hours devoted to vocational or work-related learning projects by engineers and their job performance.
8. Research is needed that compares the learning projects undertaken by engineers between the ages of 25 and 35 with engineers employed by the same employer in the 36-45, 46-55, and 56-65 age brackets.
9. Research is needed that provides a longitudinal view of engineers' learning projects over their entire career.
10. Research is needed that focuses on how engineers overcome problems encountered in pursuing learning projects.
11. Research is needed that focuses on how engineers

select the learning resources they used in pursuing learning projects.

12. Research should be undertaken that focuses on the quality of the learning projects undertaken by engineers as opposed to the quantity.
13. Research should be undertaken that focuses on establishing reliability for the estimates given by the subjects for the total number of hours devoted to learning projects.

APPENDIXES

APPENDIX A

DATA SHEET

Name _____

Degree _____

College/University _____

Job Title _____

Age at Last Birthday _____

Length of Employment in Months _____

Marital Status _____

APPENDIX B

EMPLOYEE INTERVIEW INSTRUMENT

Our research is about what sorts of things people learn. Everyone learns, but different people learn different things--and in different ways.

I'm interested in listing the things you have tried to learn during the past year.

When I say "learn," I don't just mean learning the sorts of things that people learn in schools and colleges. I mean any sort of deliberate effort at all to learn something, or to learn how to do something. Perhaps you tried to get some information or knowledge, or to gain new skills or improve your old ones, or to increase your sensitivity or understanding or appreciation.

Can you think of any efforts like this that you have made during the past twelve months?

Try to think back over all of the past twelve months, right back to last year. I am interested in any deliberate effort you made to learn anything at all. Anything at all can be included, regardless of whether it was easy or hard, big or little, important or trivial, serious or fun, high-brow or lowbrow.

It doesn't matter when your effort started, as long as you spent at least a few hours at it some time since last year.

We want to get as complete a list as possible, because we think that people make far more attempts to learn than anyone realizes. We can include any sort of information, knowledge, skill, or understanding at all that you have tried to gain--just as long as you spent at least a few hours at it sometime during the past twelve months. What else do you recall?

Now, I have a list of some of the things people learn. It may remind you of other things that you have tried to learn during the past twelve months. Take as long as you want to read each word, and to think about whether you have tried to learn something similar.

Some Things That People Learn About

A sport or game, swimming, dancing, bridge
Current events, public affairs, politics, peace, biography
Sewing, cooking, homemaking, entertaining

Driving a car
 Home repairs, woodworking, home improvement project, decorating and furniture
 A hobby or craft, collecting something, photography
 Raising a child, discipline, infant care, child's education
 Nature, agriculture, birds
 Mathematics, statistics, arithmetic
 Speed reading, effective writing, public speaking, vocabulary, literature, science, astronomy, man in space
 Health, physical fitness, posture, clothes, appearance
 History, geography, travel, some region or city or neighborhood
 Personal finances, savings, insurance, investing, purchasing something
 Psychology, effective relationships with other people, groups, leadership, social skills
 Typing, data processing, mechanical skill
 Some personal problem, mental health, an emotional problem, an illness or medical condition
 Various careers, choosing an occupation, finding a job
 Gardening, landscaping
 Something related to a job or responsibility or decision
 Musical instrument, singing, music appreciation
 Professional or technical competence, sales skills, how to teach or supervise
 Some aspect of religion, ethics, philosophy, moral behavior
 Current changes in society, the future, problems in cities, pollution, sociology
 Dating, relationship with the opposite sex, manners, marriage, relationships within the family
 Art, painting, architecture
 Business management, economics, business
 Sensory awareness, human potential, communication, understanding oneself, efficiency
 New techniques, a new way of doing something, an innovation
 English, French, some other language

Can you recall any other efforts to learn that were related to your home or your family? Anything related to your hobbies or recreation? Your job? Your responsibilities in various organizations, or clubs, or in a church or synagogue, or on a committee, or some other responsibilities? Anything related to some teaching, writing, or research that you do outside of your job?

Going right back over the past twelve months, can you recall any other times that you tried to learn something by reading a book? When you read newspapers or magazines, do you read certain topics or sections because you want to remember the content? From memos, letters, instructions, or plans? From technical or professional literature? From

material from a library? From workbooks or programmed instruction? From an encyclopedia or other reference work? From booklets, pamphlets, or brochures?

Have you learned anything at all from a medical doctor? From a lawyer? From a counselor or therapist? From a financial or tax adviser? From a social worker? From a coach? From a private teacher? From a specialist or expert? From individual private lessons?

Have you learned anything from documentaries or courses on television? From TV news or some other TV programs? From radio? In a theatre?

Have you tried to learn from conversations? Or from asking questions? That is, have there been any topics or areas that you have tried to learn about from your friends or other people? Have you deliberately sought to learn by seeking out stimulating individuals? Have you tried to learn anything from your parents or your spouse? From your brother or sister? From a neighbor?

Perhaps you have learned something in some group or other? Perhaps in some meeting or discussion group? From attending a conference? From a retreat or weekend meeting? From an institute or short course or workshop? From a committee or staff meeting? From taking a course? From attending evening classes, or lectures, or a speech? From a correspondence course? From attending a club or association?

Perhaps tape recordings or phonograph records or a language lab helped you learn something during the past year?

Have you learned in a church or synagogue? In a college, university, or school? In some community organization? In a company or factory or office? In a government program? In an exhibition, museum, or art gallery? In some vacation program? In some extracurricular activity after school? In a club? At the "Y"? At a camp?

Can you think back to twelve months ago? Try to recall your main jobs, activities, and problems at that time. Were there any efforts to learn connected with these? How about six months ago?

1. Please think for a moment about how much knowledge, information, and understanding you gained as a result of this one learning project, or think about how much your skills and habits improved, or how much your attitudes or sensitivity changed.

Would you say that altogether

- (A) You learned a large amount or changed a great deal;
- (B) You were about halfway between (A) and (C); or
- (C) You just changed or learned a little.

2. How enthusiastic have you been about having this new knowledge and skill?

- (F) Very enthusiastic;
- (G) Quite enthusiastic or fairly enthusiastic;
- (H) Not especially enthusiastic.

3. Let's set aside your own benefits for a moment and look at any benefits for other people. Your new knowledge and skill might have been of some benefit to your family, your friends and relatives, your boss, your company or organization, your field, or even to people who live in other places.

To what extent did the knowledge and skill you gained provide some benefit to people other than yourself?

- (J) To a fairly large extent;
- (K) Medium--about halfway between (J) and (L);
- (L) Only to a small extent.

Planners

There are four different sorts of learning efforts, according to who plans them. That is, a person's efforts to learn can be classified according to who was responsible for the day-to-day planning. We have to look at who planned or decided exactly what and how the person should learn at each session. For example, who decided what the person should read or hear, or what else he should do in order to learn?

1. Some learners decide to attend a group or class or conference, and to let the group (or its leader or instructor) decide the activities and detailed subject matter from one session to the next. A group may be of any size from five persons to several hundred.

2. In other learning efforts, the planning or deciding of the details is handled by one person who helps the learner in a one-to-one situation. That is, there is one helper (or instructor, teacher, expert, or friend), and there is only one learner. These two persons interact face-to-face, or through correspondence or the telephone.

Private music lessons, individual lessons from a golf pro, and being taught to drive a car by a friend are examples. Two or even three learners receiving individualized attention from one other person during the same session can be included here.

3. In some learning projects, most of the detailed planning regarding what to learn and do at each session resides in some object (some nonhuman resource).

Examples of these are: a set of recordings, a series of television programs, a set of programmed instruction materials, a workbook or other printed materials, and a

language lab. The learner follows the program or materials. They tell him what to do next.

4. In other learning projects, the learner retains the major responsibility for the day-to-day planning and decision-making.

The learner may get advice from various people and use a variety of materials and resources. But he usually decides just what detailed subject matter to learn next, and what activities and resources to use next. Instead of turning the job of planning over to someone else, the learner makes these day-to-day decisions himself.

What is the current status of your learning project? Are you still learning about _____? Have you dropped it or is it on hold?

Where did you learn about _____? At home, at work, at a library, at a school?

Where would you prefer to learn about a subject? Home, work, library, school?

Did you plan to learn about _____ deliberately, or did it just happen?

We need your best guess about the total amount of time you spent at all aspects of this particular learning effort during the past twelve months.

Please include the time you spent reading, listening, observing, or learning in some other way, if your main purpose during that activity was to gain and retain certain knowledge or skill. In other words, we will include all the times during which at least half of your total motivation was to gain certain knowledge or skill, and to retain it until at least two days later.

In addition to the time you spent at the actual learning itself, please include all the hours that you spent during the past twelve months at deciding about the learning, planning the learning, and preparing and arranging for it. This can include any time spent at deciding whether to proceed with the learning, deciding where to get help, seeking advice about these decisions (from other people or from printed materials), travelling to some of the learning activities, such as a meeting or practice session or library, arranging appropriate conditions for learning, choosing the right book or person for the actual learning, obtaining that book or reaching that person.

Of course, you cannot remember exactly how many hours, so just give your best guess. If you wish, just choose the closest number from the following list: 1, 3, 6, 10, 20, 40, 70, 100, 140, 180, or more.

What I'd like to do now is take a close look at each learning project. For example, in learning about _____, why did you decide to learn about it? What prompted your decision? How did you plan to use the information?

O.K., now I'd like to turn to the resources you used. What resources did you use to learn about _____? Examples would be such things as books, magazines, friends, and TV.

In learning about _____, did you encounter any problems such as not being able to locate the right books or finding the time?

Do you think the information you learned about has been useful to you? Have you used it in any way? How?

Perhaps some of the following kinds of people had some sort of contact with your efforts to learn. Perhaps such a person expressed some interest or encouragement, for example, or perhaps gave some advice or information or suggestions, or played some other part in your learning.

- Your brother or sister
 - Your wife or husband
 - Your mother or father
 - Your child
 - Some other relative
 - A friend
 - A neighbor
 - Someone who works with you
 - A librarian
 - A bookstore clerk or other sales person
 - A teacher or professor
- How did they help?

APPENDIX C

LEARNING PROBLEMS SHEET

Many people have encountered problems with their learning projects. Here are a list of the most frequent problems that are mentioned. Now, let's select learning about _____ from the things you've learned about during the _____ last year. Please read each problem listed and check whether it caused a problem or not.

- | | Caused a Problem |
|--|------------------|
| 1. Obtaining resources (books, persons, or other resources) | _____ |
| 2. Estimating your level of knowledge or skill | _____ |
| 3. Dealing with difficult parts | _____ |
| 4. Deciding what knowledge or skills you wanted to learn | _____ |
| 5. Deciding about time (how much time to spend and when to spend it) | _____ |
| 6. Dealing with doubts about success | _____ |
| 7. Dealing with dislike for the activity (reading, practicing, or whatever) | _____ |
| 8. Deciding about a place to learn | _____ |
| 9. Dealing with a lack of desire for achieving your goal after you began the project | _____ |
| 10. Deciding about money | _____ |
| 11. Deciding whether to continue | _____ |
| 12. Deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill | _____ |

13. Dealing with a lack of the fundamental knowledge necessary to begin a project. Before beginning to learn about economics, for example, it might be necessary to learn certain principles and procedures in mathematics

14. Developing, regaining, or maintaining certain learning skills, such as concentrating, understanding new material, and remembering

15. Dealing with the frustration that arises when learning about an area of knowledge that contains only issues and opinions and policy positions, not clear-cut answers

16. Applying the knowledge in real life situations

17. Finding and joining one or more fellow learners or experts who can provide companionship, stimulation, and encouragement

18. Persuading one or more individuals to cooperate with the project, or at least to refrain from blocking it. For example, it might be necessary to persuade an individual to cooperate with certain physical arrangements, or to alter the time at which something is done (eating dinner, for example), or to give up some time with the self-teacher or otherwise make fewer demands on his time

19. Dealing with the problem of being "slowed down" or frustrated by a fellow learner

20. Overcoming laziness or inertia

21. Dealing with (or avoiding) unpleasant physical consequences of the learning, such as the smell after practicing a new recipe or aching muscles after practicing tennis

APPENDIX D

LEARNING RESOURCES SHEET

Now let's turn to what resources you used when learning about _____. Please place a check by any resource you used.

- 1. Audio cassettes _____
- 2. Books _____
- 3. A boss or supervisor _____
- 4. Case studies _____
- 5. Consultants _____
- 6. A correspondence study _____
- 7. Credit classes _____
- 8. Films or movies _____
- 9. Film strips _____
- 10. A friend _____
- 11. Government periodicals _____
- 12. A group comprised of individuals with the same interest _____
- 13. An individual who is considered an expert in the area _____
- 14. A lecture _____
- 15. A magazine _____
- 16. A meeting _____
- 17. Noncredit classes _____
- 18. Peers or co-workers _____

19. Professional associations _____
 20. Programmed instruction _____
 21. A simulation game _____
 22. Slides _____
 23. A TV program _____
 24. A videotape _____
 25. Workshop, conference, etc. _____
 26. Other (please identify) _____
-

APPENDIX E

LEARNING PROJECTS SHEET

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APPENDIX F

INDIVIDUAL LEARNING PROJECT SHEET

Learning Project Number _____

Reason for learning (what prompted the decision) _____

Resources used _____

Problems encountered _____

Was it considered useful (has it been used)? _____

Help received _____

Current status of learning project (active or inactive) _____

Where did they learn (home, work, library, school)? _____

Was it planned or did it just happen? _____

Time spent on learning project: 1, 3, 6, 10, 20, 40, 70,
100, 140, 180, or more hours _____

APPENDIX G

TABLE XVIII

TOTAL VOCATIONAL PROBLEMS ENCOUNTERED
BY SUBJECTS

Problem	Frequency
Deciding about time (how much time to spend and when to spend it	42
Developing, regaining, or maintaining certain learning skills, such as concentrating, understanding new material, and remembering	36
Deciding what knowledge or skills you wanted to learn	34
Deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill	33
Dealing with difficult parts	32
Overcoming laziness or inertia	28
Estimating your level of knowledge or skill	27
Obtaining resources (books, persons, or other resources)	23
Dealing with a lack of the fundamental knowledge necessary to begin a project. Before beginning to learn about economics, for example, it might be necessary to learn certain principles and procedures in mathematics	23
Dealing with dislike for the activity	18
Applying the knowledge in real life situations	18
Dealing with the frustration that arises when learning about an area of knowledge that contains only issues and opinions and policy positions, not clear-cut answers	17

TABLE XVIII--Continued

Problem	Frequency
Dealing with doubts about success	17
Persuading one or more individuals to cooperate with the project, or at least to refrain from blocking it. For example, it might be necessary to persuade an individual to cooperate with certain physical arrangements, or to alter the time at which something is done (eating dinner, for example), or to give up some time with the self-teacher or otherwise make fewer demands on his time	13
Dealing with a lack of desire for achieving your goal after you began the project	11
Deciding whether to continue	8
Deciding about money	6
Finding and joining one or more fellow learners or experts who can provide companionship, stimulation, and encouragement	6
Dealing with the problem of being "slowed down" or frustrated by a fellow learner	4
Deciding about a place to learn	3
Dealing with (or avoiding) unpleasant physical consequences of the learning, such as the smell after practicing a new recipe or aching muscles after practicing tennis	2
Total	401
A mean of 3.5 problems for each learning project	

TABLE XIX

TOTAL HOBBIES AND RECREATION PROBLEMS
ENCOUNTERED BY SUBJECTS

Problem	Frequency
Deciding about time (how much time to spend and when to spend it)	16
Obtaining resources (books, persons, or other resources)	12
Finding and joining one or more fellow learners or experts who can provide companionship, stimulation, and encouragement	12
Deciding about money	11
Deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill	10
Dealing with (or avoiding) unpleasant physical consequences of the learning, such as the smell after practicing a new recipe or aching muscles after practicing tennis	9
Estimating your level of knowledge or skill	9
Applying the knowledge in real life situations	8
Overcoming laziness or inertia	8
Dealing with a lack of the fundamental knowledge necessary to begin a project. Before beginning to learn about economics, for example, it might be necessary to learn certain principles and procedures in mathematics	6
Dealing with doubts about success	4
Developing, regaining, or maintaining certain learning skills, such as concentrating, understanding new material, and remembering	4
Dealing with the frustration that arises when learning about an area of knowledge that contains only issues and opinions and policy positions, not clear-cut answers	4

TABLE XIX--Continued

Problem	Frequency
Dealing with difficult parts	3
Dealing with dislike for the activity (reading, practicing, or whatever)	3
Deciding about a place to learn	3
Dealing with the problem of being "slowed down" or frustrated by a fellow learner	3
Deciding whether to continue	2
Persuading one or more individuals to cooperate with the project, or at least to refrain from blocking it. For example, it might be necessary to persuade an individual to cooperate with certain physical arrangements, or to give up some time with the self-teacher or otherwise make fewer demands on his time	2
Dealing with a lack of desire for achieving your goal after you began the project	1
Total	130
A mean of 2.4 problems for each learning project	

TABLE XX

TOTAL CURRENT EVENTS PROBLEMS
ENCOUNTERED BY SUBJECTS

Problem	Frequency
Dealing with the frustration that arises when learning about an area of knowledge that contains only issues and opinions and policy positions, not clear-cut answers	18
Applying the knowledge in real life situations	11
Deciding about time (how much time to spend and when to spend it)	10
Deciding what knowledge or skills you wanted to learn	6
Deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill	6
Obtaining resources (books, persons, or other resources)	4
Estimating your level of knowledge or skill	4
Dealing with dislike for the activity (reading, practicing, or whatever)	4
Dealing with a lack of the fundamental knowledge necessary to begin a project. Before beginning to learn about economics, for example, it might be necessary to learn certain principles and procedures in mathematics	4
Finding and joining one or more fellow learners or experts who can provide companionship, stimulation, and encouragement	4
Overcoming laziness or inertia	4
Dealing with doubts about success	2
Deciding about money	2
Deciding whether to continue	2

TABLE XX--Continued

Problem	Frequency
Developing, regaining, or maintaining certain learning skills, such as concentrating, understanding new material, and remembering	2
Deciding about a place to learn	1
Dealing with a lack of desire for achieving your goal after you began the project	1
Persuading one or more individuals to cooperate with the project, or at least to refrain from blocking it. For example, it might be necessary to persuade an individual to cooperate with certain physical arrangements, or to alter the time at which something is done (eating dinner, for example), or to give up some time with the self-teacher or otherwise make fewer demands on his time	1
Dealing with (or avoiding) unpleasant physical consequences of the learning, such as the smell after practicing a new recipe or aching muscles after practicing tennis	1
Dealing with difficult parts	0
Dealing with the problem of being "slowed down" or frustrated by a fellow learner	0
Total	87
A mean of 3.1 problems for each project	

TABLE XXI

TOTAL HOME AND FAMILY LIFE PROBLEMS
ENCOUNTERED BY SUBJECTS

Problem	Frequency
Deciding about money	46
Obtaining resources (books, persons, or other resources	37
Deciding about time (how much time to spend and when to spend it)	30
Deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill	29
Applying the knowledge in real life situations	29
Estimating your level of knowledge or skill	27
Deciding what knowledge or skills you wanted to learn	26
Dealing with difficult parts	25
Dealing with doubts about success	23
Dealing with a lack of the fundamental knowledge necessary to begin a project. Before beginning to learn about economics, for example, it might be necessary to learn certain principles and procedures in mathematics	21
Overcoming laziness or inertia	19
Dealing with the frustration that arises when learning about an area of knowledge that contains only issues and opinions and policy positions, not clear-cut answers	17
Persuading one or more individuals to cooperate with the project, or at least to refrain from blocking it. For example, it might be necessary to persuade an individual to cooperate with certain physical arrangements, or to alter the time at which something is done (eating dinner, for example), or to give up	

TABLE XXI--Continued

Problem	Frequency
some time with the self-teacher or otherwise make fewer demands on his time	13
Dealing with dislike for the activity (read- ing, practicing, or whatever)	12
Deciding whether to continue	10
Dealing with (or avoiding) unpleasant physical consequences of the learning, such as the smell after practicing a new recipe or aching muscles after practicing tennis	10
Dealing with a lack of desire for achieving your goal after you began the project	7
Finding and joining one or more fellow learn- ers or experts who can provide companionship, stimulation, and encouragement	7
Deciding about a place to learn	5
Developing, regaining, or maintaining certain learning skills, such as concentrating, under- standing new material, and remembering	5
Dealing with the problem of being "slowed down" or frustrated by a fellow learner	5
Total	403
A mean of 4.1 problems for each learning project	

TABLE XXII

TOTAL PERSONAL DEVELOPMENT PROBLEMS
ENCOUNTERED BY SUBJECTS

Problem	Frequency
Deciding about time (how much time to spend and when to spend it)	30
Obtaining resources (books, persons, or other resources)	20
Deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill	16
Deciding about money	15
Deciding what knowledge or skills you wanted to learn	15
Overcoming laziness or inertia	14
Applying the knowledge in real life situations	13
Dealing with doubts about success	13
Estimating your level of knowledge or skill	11
Dealing with difficult parts	11
Dealing with dislike for the activity (reading, practicing, or whatever)	11
Dealing with the frustration that arises when learning about an area of knowledge that contains only issues and opinions and policy positions, not clear-cut answers	11
Dealing with a lack of the fundamental knowledge necessary to begin a project. Before beginning to learn about economics, for example, it might be necessary to learn certain principles and procedures in mathematics	9
Dealing with a lack of desire for achieving your goal after you began the project	8

TABLE XXII--Continued

Problem	Frequency
Developing, regaining, or maintaining certain learning skills, such as concentrating, understanding new material, and remembering	8
Finding and joining one or more fellow learners or experts who can provide companionship, stimulation, and encouragement	8
Persuading one or more individuals to cooperate with the project, or at least to refrain from blocking it. For example, it might be necessary to persuade an individual to cooperate with certain physical arrangements, or to alter the time at which something is done (eating dinner, for example), or to give up some time with the self-teacher or otherwise make fewer demands on his time	7
Dealing with (or avoiding) unpleasant physical consequences of the learning, such as the smell after practicing a new recipe or aching muscles after practicing tennis	5
Deciding whether to continue	5
Deciding about a place to learn	2
Dealing with the problem of being "slowed down" or frustrated by a fellow learner	1
Total	233
A mean of 3.9 problems for each learning project	

TABLE XXIII

TOTAL ACADEMIC AND GENERAL EDUCATION PROBLEMS
ENCOUNTERED BY SUBJECTS

Problem	Frequency
Deciding about time (how much time to spend and when to spend it)	1
Dealing with dislike for the activity (reading, practicing, or whatever)	1
Dealing with lack of the fundamental knowledge necessary to begin a project. Before beginning to learn about economics, for example, it might be necessary to learn certain principles and procedures in mathematics	1
Overcoming laziness or inertia	1
Obtaining resources (books, persons, or other resources)	0
Estimating your level of knowledge or skill	0
Dealing with difficult parts	0
Deciding what knowledge or skills you wanted to learn	0
Dealing with doubts about success	0
Deciding about a place to learn	0
Dealing with a lack of desire for achieving your goal after you began the project	0
Deciding about money	0
Deciding whether to continue	0
Deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill	0
Developing, regaining, or maintaining certain learning skills, such as concentrating, understanding new material, and remembering	0

TABLE XXIII--Continued

Problem	Frequency
Dealing with the frustration that arises when learning about an area of knowledge that contains only issues and opinions and policy positions, not clear-cut answers	0
Applying the knowledge in real life situations	0
Finding and joining one or more fellow learners or experts who can provide companionship, stimulation, and encouragement	0
Persuading one or more individuals to cooperate with the project, or at least to refrain from blocking it. For example, it might be necessary to persuade an individual to cooperate with certain physical arrangements, or to alter the time at which something is done (eating dinner, for example), or to give up some time with the self-teacher or otherwise make fewer demands on his time	0
Dealing with the problem of being "slowed down" or frustrated by a fellow learner	0
Dealing with (or avoiding) unpleasant physical consequences of the learning, such as the smell after practicing a new recipe or aching muscles after practicing tennis	0
Total	4
A mean of 1.3 problems for each learning project	

TABLE XXIV
TOTAL RELIGION PROBLEMS ENCOUNTERED
BY SUBJECTS

Problem	Frequency
Deciding about time (how much time to spend and when to spend it)	6
Deciding what knowledge or skills you wanted to learn	5
Developing, regaining, or maintaining certain learning skills, such as concentrating, understanding new material, and remembering	5
Dealing with doubts about success	4
Dealing with the frustration that arises when learning about an area of knowledge that contains only issues and opinions and policy positions, not clear-cut answers	4
Applying the knowledge in real life situations	4
Finding and joining one or more fellow learners or experts who can provide companionship, stimulation, and encouragement	4
Estimating your level of knowledge or skill	3
Deciding which activities (such as reading certain books or observing certain things) are necessary in order to learn the desired knowledge or skill	3
Overcoming laziness or inertia	3
Obtaining resources (books, persons, or other resources)	2
Dealing with difficult parts	2
Deciding whether to continue	2
Dealing with dislike for the activity (reading, practicing, or whatever)	1
Dealing with a lack of desire for achieving your goal after you began the project	1

TABLE XXIV--Continued

Problem	Frequency
Deciding about a place to learn	0
Deciding about money	0
Dealing with a lack of the fundamental knowledge necessary to begin a project. Before beginning to learn about economics, for example, it might be necessary to learn certain principles and procedures in mathematics	0
Persuading one or more individuals to cooperate with the project, or at least to refrain from blocking it. For example, it might be necessary to persuade an individual to cooperate with certain physical arrangements, or to alter the time at which something is done (eating dinner, for example), or to give up some time with the self-teacher or otherwise make fewer demands on his time	0
Dealing with the problem of being "slowed down" or frustrated by a fellow learner	0
Dealing with (or avoiding) unpleasant physical consequences of the learning, such as the smell after practicing a new recipe or aching muscles after practicing tennis	0
Total	49
A mean of 3.5 problems for each learning project	

APPENDIX H

TABLE XXV

RESOURCES USED IN VOCATIONAL LEARNING
PROJECTS BY SUBJECTS

Resource	Total Number of Times Utilized
Books	87
Peers or co-workers	75
An individual who is considered an expert in the area	56
Boss or supervisor	54
Group comprised of individuals with the same interest	49
Magazine	41
Meeting	36
Friend	27
Professional association	27
Lecture	26
Workshop, conference, etc.	22
Noncredit class	19
Government periodicals	18
Consultant	14
Case studies	14
Programmed instruction	10
Movies or films	9
Videotape	6

TABLE XXV--Continued

Resource	Total Number of Times Utilized
Other	5
TV program	3
Slides	3
Simulation game	1
Film strips	0
Audio cassettes	0
Credit classes	0
Correspondence study	2
Total	604

A mean of 5.3 resources used for each learning project

TABLE XXVI
 RESOURCES USED IN HOBBIES AND RECREATION
 LEARNING PROJECTS BY SUBJECTS

Resource	Total Number of Times Utilized
Friend	39
Books	38
Magazines	32
Group comprised of individuals with the same interest	27
Individual who is considered an expert in the area	18
TV program	9
Peers or co-workers	8
Films or movies	5
Meetings	5
Simulation game	4
Government periodicals	4
Consultants	4
Professional associations	3
Programmed instruction	3
Lecture	2
Other	2
Case studies	1
Film strips	1
Workshop, conference, etc.	1
Audio cassettes	0
Boss or supervisor	0

TABLE XXVI--Continued

Resources	Total Number of Times Utilized
Correspondence study	0
Credit class	0
Noncredit class	0
Slides	0
Videotape	0
Total	206

A mean of 3.8 resources for each learning project

TABLE XXVII
 RESOURCES USED IN CURRENT EVENTS
 LEARNING PROJECTS BY SUBJECTS

Resource	Total Number of Times Utilized
TV program	24
Magazine	23
Other	16
Books	12
Friend	11
Group comprised of individuals with the same interest	6
Meeting	5
Peers or co-workers	5
Government periodicals	4
Films or movies	3
Professional associations	3
Film strips	2
Videotape	2
Boss or supervisor	1
Noncredit class	1
Slides	1
Workshop, conference, etc.	1
Audio cassettes	0
Case studies	0
Consultants	0
Correspondence study	0

TABLE XVII--Continued

Resource	Total Number of Times Utilized
Credit class	0
Individual who is considered an expert in the area	0
Lecture	0
Programmed instruction	0
Simulation game	0
Total	120

A mean of 4.3 resources used for each learning project

TABLE XXVIII
 RESOURCES USED IN HOME AND FAMILY
 LEARNING PROJECTS BY SUBJECTS

Resource	Total Number of Times Utilized
Friend	72
Books	69
Magazine	55
Individual who is considered an expert in the area	45
Peers or co-workers	27
Other	25
Group comprised of individuals with the same interest	22
TV program	15
Consultants	11
Boss or supervisor	8
Case studies	7
Government periodicals	7
Lecture	4
Meeting	4
Noncredit class	4
Professional association	3
Films or movies	2
Programmed instruction	2
Videotape	2
Film strips	1
Audio cassettes	0

TABLE XXVIII--Continued

Resource	Total Number of Times Utilized
Correspondence study	0
Credit classes	0
Simulation game	0
Slides	0
Workshop, conference, etc.	0
Total	385

A mean of 3.9 resources used for each learning project

TABLE XXIX

RESOURCES USED WITH PERSONAL DEVELOPMENT
LEARNING PROJECTS BY SUBJECTS

Resource	Total Number of Times Utilized
Books	38
Friend	34
Magazines	30
Individual who is considered an expert in the area	16
Peers or co-workers	13
TV program	10
Group comprised of individuals with the same interest	10
Other	9
Government periodicals	8
Consultants	7
Films or movies	6
Lecture	5
Case studies	4
Meetings	4
Noncredit classes	3
Videotape	3
Film strips	2
Programmed instruction	2
Slides	2
Audio cassettes	1
Workshop, conference, etc.	1
Boss	3

TABLE XXIX--Continued

Resource	Total Number of Times Utilized
Correspondence study	0
Credit classes	0
Simulation game	0
Total	211

A mean of 3.5 resources used for each learning project

TABLE XXX

RESOURCES USED WITH ACADEMIC AND GENERAL EDUCATION
LEARNING PROJECTS BY SUBJECTS

Resource	Total Number of Times Utilized
Books	3
Credit classes	3
Friend	2
Individual who is considered an expert in the area	2
Programmed instruction	1
TV program	1
Videotape	1
Audio cassettes	0
Boss or supervisor	0
Case studies	0
Consultants	0
Correspondence study	0
Films or movies	0
Film strips	0
Government periodicals	0
Group comprised of individuals with the same interest	0
Lecture	0
Magazine	0
Meeting	0
Noncredit classes	0
Peers or co-workers	0

TABLE XXX--Continued

Resources	Total Number of Times Utilized
Professional associations	0
Simulation game	0
Slides	0
Workshop, conference, etc.	0
Other	0
Total	13

A mean of 4.3 resources used for each learning project

TABLE XXXI
RESOURCES USED WITH RELIGION LEARNING
PROJECTS BY SUBJECTS

Resource	Total Number of Times Utilized
Books	13
Friend	9
Group comprised of individuals with the same interest	8
Individual who is considered an expert in the area	8
Lecture	5
Audio cassettes	3
Magazines	3
Noncredit classes	3
Workshop, conference, etc.	2
Films or movies	2
Meetings	2
Peers or co-workers	2
Other	1
Professional associations	1
TV program	1
Videotape	1
Case studies	0
Boss or supervisor	0
Consultants	0
Correspondence study	0
Credit classes	0

TABLE XXXI--Continued

Resource	Total Number of Times Utilized
Film strips	0
Government periodicals	0
Programmed instruction	0
Simulation game	0
Slides	0
Total	64

A mean of 4.6 resources used for each learning project

BIBLIOGRAPHY

Books

- Bass, Bernard M., and Vaughan, James A., Training in Industry: The Management of Learning, Belmont, California, Books-Cole Publishing Company, 1966.
- Chruden, Herbert J., and Sherman, Arthur W., Jr., Personal Management: The Utilization of Human Resources, Cincinnati, Ohio, South-Western Publishing Company, 1980.
- Cross, Patricia K., The Missing Link: Connecting Adult Learners to Learning Resources, New York, College Entrance Examination Board, 1978.
- DeCarlo, Charles R., and Robinson, Ormsbee, W., Education in Business and Industry, New York, The Center for Applied Research in Education, 1966.
- Drucker, Peter F., The Age of Discontinuity, New York, Harper Colophon Books, 1978.
- Dubrin, Andrew J., Personnel and Human Resources Management, New York, D. Van Nostrand Company, 1981.
- Folley, John D., Jr., "The Learning Process" in Training and Development Handbook, edited by Robert L. Craig and Lester R. Bettel, New York, McGraw-Hill, 1967.
- Goldstein, Irwin L., Training: Program Development and Evaluation, Monterey, California, Brooks-Cole Publishing Company, 1974.
- Grabowski, Stanley M., "Motivational and Participation Patterns," in Materials and Methods in Continuing Education, edited by Chester Klevens, New York, Klevens Publications, Inc., 1976.
- Houle, Cyril O., Continuing Learning in the Professions, San Francisco, Jossey-Bass, Inc., 1980.
- , The Design of Education, San Francisco, California, Jossey-Bass, Inc., 1972.

- _____, The Inquiring Mind, The University of Wisconsin Press, Madison, 1961.
- _____, "The Nature of Continuing Professional Education," in Adult Learning: Issues and Innovations, edited by Robert M. Smith, DeKalb, Illinois, Department of Secondary and Adult Education, Northern Illinois University, 1976.
- Ingham, Roy, "The Relationship of Educative Behavior to the Leisure Satisfaction of College Alumnae," in The Continuing Learner, edited by D. Solomon, Chicago, Center for the Study of Liberal Education for Adults, 1963.
- Johnstone, John W. C., and Rivera, Ramon J., Volunteers for Learning, Chicago, Aldine Publishing Company, 1965.
- Karger, Delmar W., and Murdick, Robert G., Managing Engineering and Research, New York, Industrial Press, Inc., 1969.
- Klatt, Lawrence A., Murdick, Robert G., and Schuster, Fred E., Human Resources Management, Homewood, Illinois, Irwin-Dorsey Limited, 1978.
- Knowles, Malcolm, The Adult Learner: A Neglected Species, Houston, Texas, Gulf Publishing Company, 1973.
- _____, Self-Directed Learning, New York, Associated Press, 1975.
- Knox, Alan B., "Helping Adults to Learn," in Adult Learning: Issues and Innovations, edited by Robert M. Smith, DeKalb, Illinois, Department of Secondary and Adult Education, Northern Illinois University, 1976.
- Machlup, Fritz, The Production and Distribution of Knowledge in the United States, Princeton, New Jersey, Princeton University Press, 1962.
- McGehee, William, and Thayer, Paul W., Training in Business and Industry, New York, John Wiley and Sons, Inc., 1961.
- Peters, John M., and Boshier, Roger, "Adult Needs, Interests, and Motives," in Materials and Methods in Continuing Education, edited by Chester Klevens, New York, Klevens Publications, Inc., 1976.
- Schultz, Duane, Psychology and Industry Today, New York, The Macmillan Company, 1973.

- Sheffield, S. D., "The Orientations of Adult Continuing Learners," in The Continuing Learner, edited by D. Solomon, Chicago, Center for the Study of Liberal Education for Adults, 1964.
- Smith, Robert M., Learning How to Learn in Adult Education, DeKalb, Illinois, Department of Secondary and Adult Education, Northern Illinois University, 1976.
- Steinmetz, C. S., "The Evolution of Training," in Training and Development Handbook, edited by Robert L. Craig and Lester R. Bittel, New York, McGraw-Hill, 1967.
- Tickner, Fred, Training in Modern Society, Albany, New York, Williams Press, 1966.
- Tough, Allen, The Adult's Learning Projects, Toronto, Ontario, The Ontario Institute for Studies in Education, 1971.
- , Learning Without a Teacher: A Study of Tasks and Assistance During Adult Self-teaching Projects, Toronto, Canada, Ontario Institute for Studies in Education, 1969.
- , "Self-Planned Learning and Major Personal Change," in Adult Learning: Issues and Innovations, edited by Robert M. Smith, DeKalb, Illinois, Department of Secondary and Adult Education, Northern Illinois University, 1976.
- , Why Adults Learn, Toronto, Ontario, Ontario Institute for Studies in Education, 1968.
- Tracey, William R., Managing Training and Development Systems, New York, AMACON, 1974.

Articles

- Ashkenas, Ronald N., and Schaffer, Robert H., "Management Training for Bottom-Line Results," Training and Development Journal, 33 (August 1979), 17-22.
- Bell, Chip R., "Informal Learning in Organizations," Training and Development Journal, 31 (June 1977), 280-83, 313.
- Brown, Mark G., "Evaluating Training Via Multiple Baseline Designs," Training and Development Journal, 34 (October 1980), 11-16.

- Burgess, Paul D., "Reasons for Adult Participation in Group Educational Activities," Adult Education, 22 (Fall 1971), 3-29.
- Ferdinand, Theodore N., "On the Obsolescence of Scientists and Engineers," American Scientist, 54 (March 1966), 46-56.
- Gilbert, Thomas F., "Training: The \$100 Billion Opportunity," Training and Development Journal, 30 (November 1976), 3-8.
- Hayes, James L., "Human Resources--The Last Resources of a Frontier Society?", Training and Development Journal, 30 (June 1976), 8-10.
- Knowles, Malcolm, "Gearing Up for the Eighties," Training and Development Journal, 32 (July 1978), 12-14.
- Kulich, Jindra, "An Historical Overview of the Adult Self-Learner," International Congress of University Adult Education Journal, 9 (September 1970), 22-32.
- Miller, N. L., and Botsman, P., "Continuing Education for Extension Agents," Human Ecology Forum, 6 (1975), 14-17.
- Nickols, Frederick W., "Finding the Bottom-Line Payoff for Training," Training and Development Journal, 33 (December 1979), 54-63.
- Odiorne, George, "The Need for an Economic Approach to Training," Training and Development Journal, 33 (June 1979), 32-40.
- Olival, Louis, "Auditing Your Training and Development Function," Training and Development Journal, 34 (March 1980), 60-64.
- O'Toole, James, "Integrating Work and Learning," Training and Development Journal, 31 (June 1977), 36-48.
- Schoonmaker, Robert L., "Training Trainers on a Tight Budget," Training and Development Journal, 33 (January 1979), 8-10.
- Wilson, Clark, "Identify Needs with Costs in Mind," Training and Development Journal, 34 (July 1980), 58-62.

Reports

- Hiemstra, Roger, The Older Adult and Learning, Lincoln, Department of Adult and Continuing Education, University of Nebraska, 1975.
- Johnson, V., Levine, H., and Rosenthal, E., Learning Projects of Unemployed Adults in New Jersey, New Brunswick, New Jersey, Educational Advancement Project, Rutgers Labor Education Center, 1977.
- Penland, Patrick R., Self-Planned Learning in America, Pittsburgh, Pennsylvania, Graduate School of Library and Information Sciences, University of Pittsburgh, 1977.
-
- _____, Individual Self-Planned Learning in America, Summary Report, Pittsburgh, Pennsylvania, University of Pittsburgh, 1977.
- Peters, John M., and Gordon, R. Susan, Adult Learning Projects: A Study of Adult Learning in Urban and Rural Tennessee, Knoxville, University of Tennessee, 1974.

Unpublished Materials

- Allerton, T. D., "Selected Characteristics of the Learning Projects Pursued by Parish Ministers in the Louisville Metropolitan Area," unpublished doctoral dissertation, Department of Education, University of Georgia, Athens, Georgia, 1974.
- Armstrong, David, "Adult Learners of Low Educational Attainment: The Self Concepts, Background and Educative Behavior of Average and High Learning Adults of Low Educational Attainment," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1971.
- Benson, Frank B., Jr., "Learning Projects of Selected Administrators in Tennessee Colleges and Universities," unpublished doctoral dissertation, Department of Education, University of Tennessee, Knoxville, Tennessee, 1974.
- Booth, Nan, "Information Resource Utilization Patterns and the Learning Efforts of Low Income Urban Adults," unpublished paper read before the Adult Education Research Conference, Ann Arbor, Michigan, April 5, 1979.

- Coolican, Patricia M., "The Learning Styles of Mothers of Young Children," unpublished doctoral dissertation, Department of Education, Syracuse University, Syracuse, New York, 1973.
- Denys, L. O. J., "The Major Learning Efforts of Two Groups of Accra Adults," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1975.
- Fair, James, "Teachers as Learners: The Learning Projects of Beginning Elementary-School Teachers," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1973.
- Farquharson, A., "Peers as Helpers: Personal Change in Members of Self-Help Groups in Metropolitan Toronto," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1975.
- Field, Jeffery L., "Learning Projects of Adults of Low Literacy Attainment in Jamaica," unpublished paper read before the Adult Education Research Conference, San Antonio, Texas, April 6, 1978.
- General Dynamics Corporation, "Emphasis on Growth Potential."
- Johns, W. E., "Selected Characteristics of the Learning Projects Pursued by Practicing Pharmacists," unpublished doctoral dissertation, Department of Education, University of Georgia, Athens, Georgia, 1973.
- Johnson, Edwin, "Selected Characteristics of the Learning Projects Pursued by Adults Who Have Earned a High School Equivalency Certificate," unpublished doctoral dissertation, Department of Education, University of Georgia, Athens, Georgia, 1973.
- Kelly, N. E., "A Comparative Study of Professionally Related Learning Projects of Secondary School Teachers," unpublished master's thesis, Department of Education, Cornell University, 1976.
- Kurland, Norman, "Imperatives for Policy and Action in Lifelong Learning," unpublished report of the 1976 Wingspread Conference on Lifelong Learning in the Public Interest, Racine, Wisconsin, October 21, 1976.
- Luikart, Clark, "Social Networks and Self-Planned Adult Learning," unpublished doctoral dissertation, University of North Carolina, Chapel Hill, North Carolina, 1975.

- McCatty, C., "Patterns of Learning Projects among Professional Men," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1973.
- Miller, N. L., "Teachers and Non-Teaching Professionals as Self-Directed Learners," unpublished master's thesis, Department of Education, Cornell University, 1977.
- Moorcroft, R., "The Origins of Women's Learning Projects," unpublished master's thesis, Department of Education, University of Toronto, Toronto, Canada, 1975.
- Morris, John F., "The Planning Behavior and Conceptual Complexity of Selected Clergymen in Self-Directed Learning Projects Related to their Continuing Professional Education," unpublished doctoral dissertation, Department of Education, University of Toronto, Toronto, Canada, 1977.
- Penland, Patrick R., "Self-Planned Learning in America," unpublished paper read before the Adult Education Research Conference, San Antonio, Texas, April 6, 1978.
- Sovie, Margaret D., "The Relationships of Learning Orientations, Nursing Activities and Continuing Education," unpublished doctoral dissertation, Department of Education, Syracuse University, Syracuse, New York, 1972.
- Tough, Allen, "Interview Schedule for a Study of Some Basic Characteristics of Learning Projects in Several Populations," Toronto, Ontario, Ontario Institute for Studies in Education, April 1970. (Mimeographed.)
- _____, "Learning Tasks Performed by Adult Self-Teachers," unpublished doctoral dissertation, Department of Education, University of Chicago, 1965.
- Wickett, R. E. Y., "Adult Learning Projects Related to Spiritual Growth," unpublished paper read before the Adult Education Research Conference, San Antonio, Texas, April 6, 1978.