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I am submitting herewith a dissertation written by Ronald J. Berthelot entitled "Industrial Training: The Efficacy of a Special Drafting Training Program Versus an On-The-Job Drafting Training Program." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Curriculum and Instruction.

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INDUSTRIAL TRAINING: THE EFFICACY OF A SPECIAL DRAFTING TRAINING PROGRAM VERSUS AN ON-THE-JOB DRAFTING TRAINING PROGRAM

A Dissertation

Presented for the

Doctor of Education

Degree

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ABSTRACT

The purpose of this study was to conduct research on a non-traditional method of training industrial draftspersons. Specifically, the study reviewed various aspects of training, examined on-the-job training (OJT), and conducted research to determine the efficacy of a Special Drafting Training Program that contrasted with industrial training custom in several important ways.

In question form, the problem addressed in this investigation was, "Does a non-traditional special training program train draftspersons better than a traditional OJT training program?"

Distinctions in the Special Drafting Training Program included the following:

1. Trainee status. While the trainees were on the payroll during training, they were not assured of a job after training. Trainee performance at the end of training determined whether continued employment was given.

2. Instructor status. The instructor was a local community college educator under summer contract with the Tennessee Valley Authority (TVA) to design, implement, teach, and evaluate the special program. He was responsible for all phases of the program, and his recommendations during and at the end of the program were important factors for future trainee employment.

3. Evaluation procedures. The progress of each trainee was closely monitored by the instructor. Individual prescriptions were

given to strengthen trainee weaknesses. Post evaluative procedures were developed to test program effectiveness.

4. Learning environment. The program took place at TVA in an 8-hours-per-day, 5-days-per-week laboratory setting devoted entirely to training.

The special program began in June, 1976, and ended in August, 1976. The control group for the study was an On-the-Job Drafting Training Program conducted during the same period in other departments of TVA.

The method of the study was a descriptive survey. The writer designed two questionnaires to sample respondent perceptions. One was administered to engineers and supervisors who submitted work to the special program and/or for whom the OJT trainees worked. A second questionnaire was administered to trainees participating in both training programs. The following were the areas of investigation:

1. Difficulty and quality of work performed by both trainee groups.

2. Opinions held by respondents about both training programs.

3. Comparison of training experiences and techniques found in both programs.

An analysis of the questionnaires served as a basis for evaluating the Special Drafting Training Program. It was concluded that, overall, the special program was a better format for training than a traditional OJT program. Results showed the following:

1. Special trainees were better prepared than OJT trainees.

2. The special trainees mastered the tools of the trade and complied with drafting standards more quickly and more competely than the OJT group.

3. The quality of instruction provided to the special trainees was better than that offered to OJT trainees.

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CHAPTER I

INTRODUCTION

A. GENERAL INTRODUCTION

Early humans were concerned with almost every facet of their environment. They had to know the habitats of animals whose skins and parts were valued for shelter, clothing, tools, or food. An acute knowledge of vegetation was essential to distinguish those which provided sustenance from those harmful to human existence. By today's educational standards, persons of earlier civilizations may be classifield as "unlearned" but they were not ignorant, according to Beakley and Leach (1972, p. 21). Farb (1963, p. 164) mentions, for example, that the Eskimo discovered long ago that sled dogs contracted fatal diseases from wild artic foxes, and for centuries the Masai tribe of Africa knew mosquito bites were responsible for malaria. Both cultures learned to survive and schooled their offspring in survival, including techniques employed in making hunting implements and tools. Countless other tribes and cultures did the same.

Permanent communities increased as humans began to cultivate plants and domesticate animals, thereby increasing food production and freeing the population for other activities. By-products of this new leisure included metal tools, written communication, and various construction projects necessary for community improvement and well being. This activity created a system of workers and managers, the beginnings of a class society (Beakley and Leach, 1972, p. 4).

Beakley and Leach (1972, p. 4) noted that this early society spawned the first craftsmen who produced useful items such as tools, pottery, and other items or services desired by the community or region.

Many activities of the early craftsmen paralleled those of modern industry. They were concerned with procuring and storing raw materials, pricing goods and services, quality control, transporting and marketing finished products, and teaching skill development to assure the success of their industry. Many of these early training programs have been modified and adapted for use in today's industrial community. This is a dynamic process that will continue into the future. An ever growing number of adults and youth will need training and retraining to satisfy the constantly changing needs of industry (Russo, 1966, p. 16).

Historically, says Schwaller (1977, p. 13), education in industry was considered a burden that required extra expense for many companies. Industry found it difficult to justify these additional expenditures because the value of training was not immediately felt.

Today, many companies view training as a profitable investment for future years. According to Willard (1973, p. 13), industry has accepted training as a legitimate function of business.

Industrial training (sometimes called cost effective training) has resulted in increased corporate earnings for many companies. The Marriott Corporation has turned its training department into a potentially profit-generating division, reports Kaczmar (1972, p. 13). Marr (1972, p. 44) writes that in order for training to be monetarily

profitable to a company, training objectives should be chosen on the basis of potential return. Along with the profit motive, improvement in job performance is also an important function of industrial training (Brigham, 1969, p. 12).

If training programs are to be worthwhile, industrial educators must devote the best of their creative abilities to the study, development, and evaluation of industrial training programs which have meaning and relevance. Although the study, development, and evaluation of training programs are difficult and laborious tasks, they are ones to which priority should be given.

B. BACKGROUND OF THE STUDY

In April, 1976, the investigator was under contract by the Tennessee Valley Authority (TVA) to begin developmental work toward the formation of a Special Drafting Training Program for the Division of Engineering Design at TVA's Knoxville facilities. The program was active from the first week of June, 1976, until the last day of August, 1976. This was TVA's first drafting training program developed, implemented, taught, and evaluated by a professional educator. The program was a fresh approach to training at TVA.

Today, as in the past, TVA trains new draftspersons through on-the-job training (OJT). The success of on-the-job training is largely determined by individual trainers responsible for a trainee, according to Miller and Rose (1975, p. 279). Basically, a trainee "tags along" with a trainer to learn a particular trade or line of work. Since the trainer is serving two masters, his/her work

responsibilities and training, the intensity of and attention to training is usually determined by the work load of the trainer. On many occasions the trainee is a passive observer as the trainer completes his/her work responsibility.

The Special Drafting Training Program was unlike the On-the-Job Drafting Training Program in several respects. The special program took place in an 8-hours-per-day, 5-days-per-week laboratory setting devoted entirely to training. The training instructor had no work requirement other than training the special program participants. This seems to be in accordance with Chowenhill's (1973, p. 26) contention that continuous practice and concentrated work experience are necessary for proper skill development in the drafting profession.

The special program closely paralleled what Nadler (1977, p. 28) calls "non-employee education." In non-employee education, potential employees participate in controlled learning experiences or training sessions to determine whether the individuals possess needed job skills. Additionally, the potential employee learns whether he/she really wants to work for the company involved. The primary difference between Nadler's concept and TVA's approach is that Nadler would not place the individual on the payroll until the pre-employment training is completed. The special trainees were on TVA's payroll during training but were not assured of employment after training unless they successfully completed the program.

Nadler (1977, p. 29) further indicated that the idea of prior-to-hire training is not new, but many organizations are familiar with some of the more traditional programs in employee selection such

as cooperative programs, internships, and work-study. These programs are aimed specifically at students or adults who have not yet entered the labor market. According to Nadler (1977, p. 28), these programs prepare people for work, though not necessarily for the specific organization or business sponsoring the program.

TVA's Division of Engineering Design had decided to conduct this type of training program for several reasons:

1. To meet 1980 employment goals for employing racial minorities and women in technically oriented professions.

2. To determine if employees with little training and work experiences in drafting could learn to perform drafting work quickly and correctly according to established TVA Drafting Standards.

3. To test the possibility of conducting such a program in the future.

Garrett (1976), TVA's Training Director, indicated that for TVA the Special Drafting Training Program represented a change in training design and supervision and in the status of the participants. Though the participants were on the payroll during training, they were not assured of placement at the end of training. Trainee performance and degree of skill development were two important criteria used in determining future employment (Garrett, 1976).

Like other industries providing some form of non-employee or employee training, TVA was interested in receiving outcome information about the success or failure of the program. These evaluative data are helpful for future program decisions.

While other variables obviously exist, such as trainee

background and experiences, this researcher assumed that the success or failure of trainee performance rested largely with the success or failure of the Special Drafting Training Program.

C. NEED FOR THE STUDY

A review of the literature on industrial training indicates information and studies on designing and developing curriculum and program evaluation are scant.

Studies have concentrated on components or parts of curriculum design and development rather than the whole. Ricks (1977, pp. 58-59), for example, looked at the importance of a well planned course introduction. Additionally, Zemke (1977, pp. 16-20), Becker (1977, pp. 21-22), Nammacher (1977, pp. 22-24), and others studied tasks or activities associated with performing a particular job effectively. Such approaches tend to oversimplify the curriculum building process, says Hindes (1973, pp. 38-39). Valuable components are often omitted, components such as individual differences among students, readiness, or related current or prior instruction.

Broadwell (1977, p. 74) and Smith (1977, pp. 16-17) indicated the importance of designing and developing effective curriculum. Those who work in the area of industrial training should know how to write complete programs.

The literature supports the contention that effective evaluations of curriculum and programs are lacking in industry. Lundberg, et al., (1973, p. 29) report a general feeling in industry that most training programs are effective, but no particular reasons are given

No factual studies or evaluation procedures were used to support program effectiveness. The notion of deleting post-course evaluation on the assumption that results are already known means trouble, according to Goodell (1969, p. 43). The literature suggests an underlying assumption that merely offering training programs means positive results.

Interest in evaluating industrial training programs is increasing (Polleys, 1969, p. 50 and Becker, 1977, p. 26). However, there still seems to be a lack of knowledge on the applications and construction of evaluative tools in industry.

Since the Special Drafting Training Program was a departure from traditional programs, it was important that a study be conducted to determine if this provides a viable method of industrial training. The success or failure of this approach may suggest directions for industries in the future. Also, this research may serve as a model to evaluate other training programs.

D. PURPOSES OF THE STUDY AND STATEMENT OF THE PROBLEM

Purposes

The purposes of this study were:

1. to determine if the non-traditional Special Drafting Training Program format is a viable alternative for training draftspersons,

2. to determine if TVA employees with little training and work experience in drafting could learn to perform drafting work quickly and correctly according to TVA Drafting Standards, and

3. to suggest possible directions for training industrial draftspersons in the future.

Problem Statement

In question form, the problem addressed in this study was, "Does a non-traditional Special Drafting Training Program train draftspersons better than a traditional On-the-Job Drafting Training Program?"

In order to gather data pertinent to the problem, several sub-questions regarding the special and OJT training programs under study were formulated:

1. What similarities and differences existed in the quality of work performed by participants in the two types of training programs?

2. What similarities and differences existed between trainee groups with respect to number of errors appearing in completed work, their ability to conform to TVA Drafting Standards, their ability to follow instructions, reproductive quality of completed work, and length of time required for completing changes and redraws?

3. Trainees from which program are most preferred as future employees by engineers and supervisors?

4. What similarities and differences existed between the training programs in terms of organization, use of time, preparation and agreement for work after training, and mastery of TVA Drafting Standards?

5. What similarities and differences existed between the training programs with respect to instructional variables such as

teacher effectiveness and availability, use of methods, and evaluations?

6. What similarities and differences existed between the training programs with respect to the quality of overall instruction and training?

E. DESIGN OF THE STUDY

Introduction

The Special Drafting Training Program was developed in four stages. Stage one identified TVA training needs through interaction with engineers, supervisors, and TVA's training director, and through studying TVA's drafting standards manual. Stage two consisted of placing the needs into a logical program outline. During stage three the researcher solicited comments about the program outline from stage one personnel. The final stage produced the finished program outline. Taken as a whole, the special and OJT programs were more dissimilar than similar.

1. The special trainees had a full time instructor, and OJT trainees were assigned to individual instructors who divided their time between work and teaching.

2. All trainees were employed during training. OJT trainees filled existing vacancies while temporary positions were created for special trainees. Special trainees were informed that should they do well in training they could expect future employment with TVA.

3. The special program was more formal and structured than the OJT program. The special participants were in training full time with experiences documented by a course outline. The amount of time

devoted to training OJT trainees was subject to instructor work load, and experiences were products of company experience with no written program outline.

4. OJT trainees began working on drawings in the field (drawings generated by various departments in TVA) before special trainees. While both groups completed similar drawings from the field, special trainees received related instructions and experiences which primed them for work on field drawings.

5. Education and previous related work experience between the groups were similar before employment by TVA.

Methods used during both programs were similar. The programs used a variety of methods including demonstration, problem-solving, lecture, and self-pacing.

Situation

The Special Drafting Training Program was a 40 hours-per-week laboratory setting devoted entirely to training. The training instructor was employed full time to teach the special program participants.

Under the traditional On-the-Job Drafting Training Program, trainees were assigned to individual trainers (experienced workers) at the job site. Trainers were obligated to carry their usual workload in addition to their training responsibilities.

Both training programs were conducted during the same three month period in the summer of 1976.

According to Garrett (1976), TVA's Training Director, the educational background and drafting experience of the special and OJT

trainees were similar.

Participants in both training programs were on the payroll during training but the special trainees were not assured of employment at the end of training. Special trainee performance and degree of skill development were two important criteria used in determining future employment.

Procedure

Answers to the sub-questions framed in the problem statement were provided through the use of two author-designed questionnaires. One questionnaire administered to engineers and supervisors investigated work performance of both trainee groups. The second questionnaire was administered to the special and OJT trainees. Both questionnaires sampled respondent attitudes and perceptions.

The study sought responses from total populations of three groups: engineers and supervisors, trainees who completed the Special Drafting Training Program, and trainees who completed the On-the-Job Drafting Training Program.

A total of twenty-six employees received questionnaires. Twelve employees were engineers or first line supervisors. They submitted work for the special trainees and/or the OJT trainees. The remaining fourteen employees were composed of eight special and six OJT trainees. All twenty-six questionnaires were returned.

Questionnaires were administered and collected by TVA's training officer. Completed questionnaires were sent to the training officer in sealed envelopes through the inter-agency mail service.

Respondents were not required to identify themselves by name or department.

The engineer and supervisor questionnaire was administered two weeks after the completion of the special and OJT programs. OJT and special trainees received the trainee questionnaire six months after the completion of both training programs. Those time frames were selected on the recommendation of TVA's training director. Engineers and supervisors require slightly more than a week to check completed drawings and six months after the completion of training marks the end of an employee's probationary period (Garrett, 1976).

Questionnaire responses from both instruments were recorded and tabulated for statistical purposes.

The statistical treatments applied to questionnaire data were percentage ratios and percentage distributions (Tate, 1965; Champion, 1970; and Loether and McTavish, 1974).

F. ASSUMPTIONS OF THE STUDY

The following was the major underlying assumption of the study: content of the Special Drafting Training Program rather than the personality or procedures of the individual instructor was largely responsible for the trainees' success.

It was also assumed that a concentrated, 8-hours-per-day, 5-days-per-week, laboratory setting is a better training experience than an OJT format and will better prepare trainees for the job.

G. LIMITATIONS OF THE STUDY

A major limitation of the study was its limitation to one industry and one training program with a limited number of participants. The limited number of participants resulted in a small number of respondents in both training groups. Although total populations were sampled and a 100% return was realized, there were only eight special trainees and six OJT trainees.

It also must be recognized that the questionnaire results represented the personal perceptions and feelings of the respondents and may not be as reliable as a behavioral measure in assessing program results.

H. DEFINITION OF TERMS

The following are operational definitions for terms used throught the study.

Changes and/or Redraws

Changes and/or redraws are modifications made by drafting personnel on existing drawings or blueprints.

Curriculum

Curriculum is a composite of ideas, activities, and experiences offered in a particular educational or training environment. Included in curriculum are philosophy, goals, objectives, content, instructional strategies, and evaluation.

Evaluation

Evaluation is a judgmental process used to make decisions about an educational or training program or curriculum.

Industrial Education

Industrial Education is a generic term which includes programs offered by or for industry for the purpose of teaching manipulative skills and related information.

Industrial Educators

Industrial educators include industrial training directors and trainers, consultants, and professional educators.

Industrial Training

Training conducted by industry; it focuses on how something is done with little regard on why something is done.

New Training Program

New training programs are programs implemented by a company to satisfy certain training needs.

On-the-Job Training (OJT)

OJT is an individual training program organized and sponsored by an agency or company for a prescribed period of time, during which a new employee learns the job from one or more experienced employees.

OJT Trainees

OJT trainees are those individuals who receive on-the-job training.

Program

According to Pyatte (1970, p. 388) a program represents a complete, progressive series of studies leading toward the attainment

of some goal. The goal may be an improvement in job performance, a promotion, performance of new duties, and acceptance of additional responsibility, etc. Pyatte's definition was accepted for purposes of this study.

Special Drafting Training Program

The Special Drafting Training Program was a three month, self-paced training program that deviated from TVA's normal method of training draftspersons through on-the-job training.

Special Trainees

The special trainees were those individuals who received training in the Special Drafting Training Program.

The Tennessee Valley Authority (TVA)

TVA is a federal agency which was formed in 1933 by an act of Congress. TVA was to be a planned program of conservation and development for the entire Tennessee River Valley.

TVA Drafting Standards

The TVA standards are written and pictorial prescriptions for providing uniformity on drafting work completed by TVA personnel. Standards relate to line quality, lettering and symbol requirements, spacing techniques, drafting formats and materials, and reproductive requirements.

Up-Grading Training Program

Up-grading training programs are offered to employees to increase skills, knowledge, or performance on jobs presently held by

these persons. Emphasis is placed on how something is done with little regard for why certain activities are conducted.

I. ORGANIZATION OF THE STUDY

Chapter I presents a general introduction to the study, explains the background and need, provides the statement of the problem, includes the definition of terms, outlines assumptions and limitations, expresses anticipated findings, and presents the organization of the study.

Chapter II reviews the literature.

Chapter III describes the method and procedures used in the study.

Chapter IV includes the analysis and presentation of data through the use of questions framed in the problem statement.

Chapter V presents conclusions, discussion, implications, and recommendations.

CHAPTER II

REVIEW OF THE LITERATURE

A. INTRODUCTION

Since no studies were found, empirical or otherwise, which directly related to this investigation, the review of the literature examines areas pertinent to the investigation. This chapter will examine the following areas: (1) industrial training, its purposes and various program options used by industry, (2) on-the-job training, and (3) designing and developing training programs. These areas merit review for a variety of reasons.

1. Industrial training is more varied and less understood than other forms of schooling, such as secondary education (Drawbaugh, 1977, p. 27).

2. Because on-the-job training participants served as the control group, OJT merited examination.

3. Curriculum development was an important activity for the special drafting program.

4. The literature was scant on directions for designing and developing training programs.

Industrial practices and training programs have been the subject of various articles and studies over the years, but no study was found which related directly to this investigation. Existing studies were conducted by both educators and industrial personnel. Educators such as Randall (1957), De Vore (1961), Oliver (1965), and Schamehorn (1965), for example, studied industrial needs or practices to up-grade

or improve drafting programs on the secondary or post-secondary levels. Industrial personnel such as Kaczman (1972, p. 36), Becker (1977, p. 26), Henske (1978, p. 36), and others were concerned with determining cost effectiveness of training programs. Programs were judged successful if dollars were made or saved by the training activities.

B. INDUSTRIAL TRAINING

Clement (1979, p. 54) reported that the purpose or objective of industrial training is to improve worker performance on new and existing tasks. Schwaller (1977, p. 12) expanded on Clement's observation by indicating nine reasons for establishing industrial training programs. In summary, they are as follows:

1. To help employed workers become more adaptive in performing tasks.

2. To train prospective employees where labor shortages exist.

3. To provide opportunities for new employees to increase basic wages in shorter periods of time.

4. To incorporate acceptable standards and introduce new production techniques or processes.

5. To provide educational experiences or training in the proper care and treatment of tools and equipment.

6. To reduce cost through the reduction of time necessary to learn new skills or tasks.

7. To enable an industry to be more effective in increasing productivity.

8. To work toward improved employee job satisfaction.

9. To induce employees to work with speed and accuracy while maintaining quality and safety to meet various production goals.

A number of training program options are available to satisfy one or more of the objectives listed above. These program options may include apprenticeship training, cooperative training, on-the-job training, supervisory training, training employees for specific jobs or up-grading training, or training for promotion. Industry may concurrently offer two or more different programs or sections of one or more programs. Brief discussions of the program types follow.

Apprenticeship Training

Apprenticeship training is the oldest form of industrial training in the United States (Hawkins, et al., 1951, p. 335). It also marked the first legal attempt by the American colonies to enforce a child's education (Rippa, 1971, p. 29). Laws detailed the terms under which an individual was to serve as an apprentice. Typically, the master was required to care for and teach a trade to a child while the child was required to serve faithfully. This early apprenticeship training followed the European model, which was a form of indentured servitude for a prescribed period of time. The period of time varied from three to eight years (Wood, 1977, p. 3).

Today, an apprentice is an active worker on a production site or in industry while receiving classroom related instruction. An agreement is signed by the apprentice describing trainee responsibilities, length of training (usually three to four years), number of

hours on the job, related instruction, and wages for each six month training period.

While applicable to a small percentage of the labor force, according to Wenrich and Wenrich (1974, p. 182), apprenticeship programs are used to train highly skilled workers in certain manufacturing and construction trades.

Cooperative Training

Cooperative training, often called cooperative education, began on the campus of the University of Cincinnati in 1906, when an engineering dean included practical on-the-scene experiences for engineering students (Prappen, 1975, p. 51). Unlike other forms of industrial training, the participants of cooperative training are enrolled in school while receiving training at area companies or businesses.

Professor Harry Huffman (1969, p. 16) at Colorado State University saw the primary objective of cooperative programs as turning out skilled, responsible students who upon graduation can assume a productive place in a technical society. These programs are well developed instructional activities requiring a teacher-coordinator who is responsible for organizing activities around the student-trainees' career interests and goals. An integral part of the program includes paid employment. This employment may be part-time with related classroom instruction. Typically, the student-trainee divides the day between school and work. Another situation calls for the student-trainee to be employed full-time and in school full-time on alternating

semesters or terms.

According to Herr (1977, p. 11), Wenrich and Wenrich (1974, p. 254), Essex (1968, p. 202), and others, the benefits and advantages of cooperative programs are shared by students, employers, and the educational institutions offering the program. Not only does cooperative education develop strong ties between education and industry, participants often have a head start in securing jobs because they receive work experience for which training is provided.

In addition, students have an opportunity to see how their attributes and attitudes relate to the total work situation. The public and private agencies or companies that contract to hire cooperative trainees benefit by filling immediate manpower needs and by having a pool of proven talent to draw from in the future. Through these programs, institutions are provided with an opportunity to promote cooperation with the community. Finally, the institution and its faculty can experience an up-grading of knowledge while working with the industrial and business community.

Along with the factors mentioned above, Fruekling (1976, p. 2) feels that cooperative training allows the student-trainee to experience and acquire career maturity skills. These skills involve human relations and coping skills which may directly affect an employee's chances of job survival.

On-the-Job Training

A study conducted by Utgaad and Davis (1970, pp. 40-41) indicated that on-the-job training (OJT) headed a list of well-known

training programs used by businesses and industries in the Minneapolis-St. Paul area. OJT is often called field training because training occurs mostly at the job site. It is used to teach employees numerous occupational competences. The control for this study was an OJT program. For this reason, OJT is examined in greater detail later in the chapter.

Supervisory Training

It is difficult for an organization to perform appreciably above the level of its foreman and middle management personnel, regardless of the caliber of its top management. The foreman, for example, serves as director of production and acts as the interpreter of management to the employees. In this dual capacity the foreman stands between the rank and file and management. Spriegel (1958, p. 44.9) indicated that supervisory training must be aimed at developing leadership qualities.

Techniques used in supervisory training may include role playing, conference methods, group dynamics training, or management seminars. Settings for the training may be in-house, at a local college, or a retreat facility.

Training Employees for Specific Jobs

Training programs which train employees for specific jobs may require the development of up-grading or new training programs. Up-grading training is offered to employees to up-grade skills, knowledge, or performance on jobs presently held by these persons. In order to keep up with the explosion of technological changes and in-

formation, industry has a constant need for in-service or up-grading training.

Up-grading needs are usually very specific. Unlike general education programs, employers are careful to train only as many workers as needed and to provide a measured amount of training so employees can effectively handle new duties or assignments. Brecher (1971, p. 113) indicated that to provide more may cause the employee to shop around for a new job which would take advantage of a broader training experience. Freeman (1977) and Prewitt (1977) mentioned that employers are interested in hardware instruction, teaching their equipment, and not the presentation of principles or processes.

New training programs, on the other hand, provide measured amounts of principles or processes. These programs are designed to train prospective workers or new employees in new skills and knowledge. When companies relocate to areas without a pool of skilled workers, if present programs are believed ineffective, or if special needs arise, new training programs may be implemented.

Training for Promotion

Because of deaths, retirements, resignations, or other turnover factors, industry may conduct training for promotional purposes. Training for promotion, says Spriegel (1958, p. 44.7), is generally used by industry to promote from within the organization.

Industry uses a variety of training programs. The value of any program is evaluated in terms of dollars made or saved because of what trainees learn to do differently or better (Becker, 1977, p. 26). Dollar investments are high. According to Carter (1975, p. 26),

industry is spending almost as much for employee training as is spent by the nation in educating its youth.

C. ON-THE-JOB TRAINING

The origins of on-the-job training are difficult to trace. Early humans used this type of training to communicate and up-grade their craft. I. N. Thut (1957, p. 70) indicates that on-the-job training existed in Plato's day (427-347 B.C.).

Today, on-the-job training is the most common type of training program offered by American industry, according to Nardone (1976, p. 17), although training methods vary from company to company. This information was revealed in a nationwide survey of industrial training directors.

Because on-the-job training means many different things in many different situations, no all-encompassing definition exists (Miller and Rose, 1975, p. 260). Numerous and varied individuals learn and develop through formal OJT experiences.

Formal training is organized and sponsored by an agency or company. These agencies or companies range from large corporations to the local automotive shop. In the mechanics trade, for example, large companies train fluid mechanics through on-the-job training (Sullivan, p. 11). Tobolt (1976, p. 237) mentions the use of OJT by local auto body shops.

Sedlik (1977, p. 25) and others refer to OJT as "field-implemented" training. This term appears to adequately describe OJT as practiced by many industries or institutions because training occurs

mostly at the job site.

Like any other educational program or learning experience, on-the-job training requires careful consideration and planning. Rose (1966, p. 311) suggested that program developers and instructors of OJT programs answer the following questions:

1. What skill development and information is required for adequate job performance?

2. What areas of training require more attention based on the participants' background experience?

3. What experiences must be provided to facilitate necessary skill development?

In order to provide satisfactory responses to the questions suggested by Rose, a carefully designed OJT program recognizes current employee performance levels and determines desired performance. In other words, objectives or training outcomes must be based on and measured against present performance. Rose (1966, p. 309) offers the following steps toward achieving an effective training program:

1. Inventory or analyze the skills and knowledge required for successful performance of work requirements.

2. Compare employee skills and knowledge against the inventory to determine training needs.

3. Develop a plan and schedule the training program.

4. Conduct training as planned around the work schedule of trainers and trainees.

5. Use the job inventory to evaluate the outcomes of the training program.

6. Schedule additional practice on the job for continual skill development of the trainees.

According to a survey conducted by Nardone (1976, p. 18), local colleges are working more closely with industry in providing on-the-job training. Roane State (Tennessee) Community College and Pensacola (Florida) Junior College, for example, are becoming more involved in OJT training for local industries.

Capstick (1976), while Chairman of the Industrial-Technology Department at Pensacola Junior College, indicated that his department conducted only one program during the fall of 1975; but during the fall of 1976, five OJT programs were offered.

Although few organized programs existed prior to World War I, on-the-job training programs have become an integral part of business and industrial training (Roberts, 1971, p. 389). OJT will continue to be employed by industry to train new employees, promote experienced workers, and introduce new products or processes.

D. DESIGNING AND DEVELOPING TRAINING PROGRAMS

Toffler (1970, pp. 1-561) in his book Future Shock examined future uncertainties and consequential spin-offs of human actions. In order to minimize these occurrences, Toffler suggested that the many dimensions involved in planning should be considered before implementing a course of action. The same is true in curriculum development. Program developers should follow carefully designed sequences of activities before, during, and after curriculum implementation.

Perhaps the two most significant issues facing industrial

curriculum developers are (1) a dynamic and constantly changing technological society and (2) the tendency to limit the educational aspects of training. Curriculum must be flexible enough to accomodate a changing environment. This is very important in order to avoid the teaching of obsolete skills, knowledge, and attitudes (Swanson, et al., 1969, p. 23). Additionally, program developers of every persuasion should examine long term effects of curriculum development questions such as those posed by Tyler (1977, p. 11):

1. What will be the objective of the proposed curriculum?

2. What will be the learning experiences necessary to achieve the objectives?

3. What pattern or plan will be used to organize the learning experiences?

4. How will the effectiveness of the curriculum be evaluated to determine worth and to make decisions?

According to Hindes (1973, p. 38), there is a definite distinction between training and education. Training is teaching individuals how something is accomplished. Education includes both how and why something is done. It seems that educational programs may be drifting toward training programs because of the increased emphasis on accountability, behavioral objectives, criterion-referenced testing, the systems approach to curriculum planning, and the acceptance of various industrial and/or military models of curriculum development. These activities or approaches, reports Hindes (1973, p. 38), often lead to simply listing tasks and activities performed by individuals in the field. In effect, curriculum planners are conducting trade or

occupational analyses. Merely listing tasks and activities tends to oversimplify the process. Colleges of education, for example, may construct a curriculum model based on an inventory of the activities and tasks performed by public school teachers. Prospective teachers would be trained to teach according to this model. Curriculum developers have been building training programs by employing this technique or process in determining curriculum content, according to Hindes (1973, p. 39).

Conducting an inventory of the tasks and activities performed by field personnel is not a difficult undertaking. Likewise, it is not difficult to carry the process through the additional steps necessary to convert training programs into educational programs. These steps include determining and teaching the concepts, principles, and rules upon which tasks and activities are based. In educational curriculum, efforts are made to present all available information bearing on any subject, according to Foster (1971, p. 178). Also, an educational program must have a planned design to include not only how something is done but also why something is done. Curriculum developers should incorporate measured elements of both when developing industrial training programs.

Definitions of curriculum vary. Saylor and Alexander (1974, pp. 2-3) said curriculum, as currently used in the United States, is composed of subjects and subject matter which is taught by teachers and learned by students. Caswell and Campbell (1935, p. 69) saw curriculum as a composite of all the experiences students receive under the direction of a teacher. On the other hand, Giachino and Gallington

(1967, p. 21) view curriculum as the orderly arrangement of ideas, activities, and experiences which learners pursue for the attainment of goals or educational objectives. These ideas, activities, and experiences are a composite of the entire offerings of a particular educational environment.

As practiced in industry, many training activities are not concerned with the entire curriculum but with a component of the curriculum, a program of study (Saylor and Alexander, 1974, p. 3). These programs are developed to satisfy a particular industrial need (Wilson, 1966, p. 13).

Finally, industrial program developers need to "think women" when developing programs. Not only are women now employed in "non-traditional jobs," they are actively seeking programs which provide training for those jobs (Capstick, 1976).

E. SUMMARY

No studies were found which directly related to this investigation. Past studies were concerned with (1) improving drafting curriculum in secondary or post-secondary schools, (2) determining cost effectiveness of training programs, or (3) determining the types and frequency of training programs used in industry.

Educators such as Randall (1957), De Vore (1961), Oliver (1965), and Schamehorn (1965) studied, through surveys, industrial needs or practices to up-grade, improve, or develop model drafting programs for secondary or post-secondary schools.

Industrial personnel such as Kaczman (1972, p. 36), Becker

(1977, p. 26), Henske (1978, p. 36), and others examined company financial statements before and after training to determine cost effectiveness of training programs. Programs were judged successful if income was generated or costs were saved by the training activities.

Finally, researchers such as Brecher (1971, p. 113), Nardone (1976, p. 17), and Utgaad and Davis (1970, pp. 40-41) surveyed business and industry to determine the types of training programs used in different parts of the country.

CHAPTER III

DESIGN AND PROCEDURES

A. INTRODUCTION

The special drafting training program was a structured program designed to carry the trainee through a series of dependent units and activities. The units and activities were dependent in that information and skill development from one unit served as a foundation for another unit. Units and activities were progressively more difficult with time.

The program contained units in (1) types of lines, (2) lettering, (3) symbols, (4) lead and ink representation, (5) two and three dimensional representations, (6) dimensioning, (7) scaling, (8) notes and special instructions, (9) mechanical, civil and electrical drawing, and (10) problems or work from engineers and supervisors in the field. With the exception of unit ten, activities included completion of a minimum number of selected text book problems at the end of each unit. Time tables were established for completion of problems.

As problems were completed, they were evaluated. Weaknesses were noted, and additional problems were assigned on an individual basis to improve performance through personalized instruction and practice. Group progress was constantly monitored so that large or small group presentations could be given at relevant times.

Instructional methods used during the special program included a mix of demonstration, lecture, problem solving, and self-pacing.

The primary methods were problem solving and self-pacing.

Resources used for the design and development of the special format included TVA's drafting standards, professional literature, professional experience and education, and interaction with TVA personnel and colleagues.

According to Garrett (1976), TVA's Training Director, TVA's on-the-job training was a product of company experiences over the years. Typically, a new trainee is required to study TVA's drafting standards, then assigned problems to test lettering, line, and symbol quality before working on field drawings. The length of time devoted to those activities are determined by trainer ability, trainer judgment, and trainer work load between assignments and instructions. While the trainer's first priority is training, Garrett (1976) indicated that the trainer's work load often infringed on training responsibilities. So, unlike the special program, OJT training at TVA is loosely structured.

B. DESIGN

The study took the form of descriptive survey research. Survey research collects evidence about an existing situation and is frequently helpful in or contributes to other types of research. This study may contribute to other investigations which have the primary purpose of making decisions on the value of industrial training programs.

The research question under investigation was "Does a non-traditional training program train draftspersons better than a tradi-

tional on-the-job training program?"

This study attempted to answer six questions regarding the two types of training programs. Answers to these questions were provided through the use of two author-designed questionnaires. Both sampled respondent attitudes and perceptions. One, given to engineers and supervisors, sought answers to the following questions:

1. What similarities and differences existed in the quality of work performed by participants in the two training programs?

2. What similarities and differences existed between both trainee groups with respect to number of errors appearing in completed work, their ability to conform to TVA Drafting Standards, their ability to follow instructions, reproductive quality of completed work, and length of time required for changes and redraws?

3. Trainees from which program are most preferred as future employees by engineers and supervisors?

The second questionnaire was administered to trainees in the non-traditional (special) and traditional (OJT) training programs. Trainee perceptions were sought to answer the following three questions:

1. What similarities and differences existed between the training programs in terms of organization, use of time, preparation and agreement for work after training, and mastery of TVA Drafting Standards?

2. What similarities and differences existed between the training programs with respect to instructional variables such as teacher effectiveness and availability, use of methods, and evaluations?

3. What similarities and differences existed between the training programs with respect to the quality of overall instruction and training?

Questionnaires were administered and collected by TVA's training officer. Respondents were not required to identify themselves.

An integral part of survey research is data analysis and treatment. According to Selltiz, et al., (1963, p. 386), analysis is used to summarize observations in order to yield answers to research questions.

Questionnaire responses were recorded and tabulated for statistical purposes. Percentage ratio and percentage distributions were used for both questionnaires.

Data were portrayed through the use of tables. Written explanations accompanied the tables. Also, a summary of the findings was presented.

C. PROCEDURES

Population

The study was based on questionnaire responses from total populations of three groups: engineer and supervisory personnel, trainees who completed the Special Drafting Training Program, and trainees who had completed an On-the-Job Drafting Training Program.

Twenty-six employees received questionnaires. All were returned. The twenty-six respondents included twelve engineers and/or

first line supervisors (who submitted work for the special drafting trainees to complete or change and/or for whom the on-the-job trainees worked), eight special drafting trainees, and six OJT drafting trainees. Both trainee groups entered their respective programs during the last week of May, 1976, or the first week of June, 1976. The training programs ended on the last day of August, 1976.

Engineers are primarily responsible for developing and designing various systems and components used in the generation of electricity. Supervisors are primarily responsible for interpreting and communicating the engineer's work to experienced draftspersons who commit the designs to drafting prints in accordance to TVA Drafting Standards. After these prints are completed, engineers and supervisors check them for accuracy, clarity, and quality and note whether changes or redraws are required. Changes and/or redraws are performed by less experienced draftspersons or drafting trainees, depending on the complexity of changes or redraws. The process of checking continues until all errors and modifications conform to TVA Drafting Standards and engineering designs and specifications. These practices and procedures place the engineer and supervisor in contact with the drafting personnel, and their experience and expertise allows for evaluation of an individual's drafting performance.

The educational background and drafting experience of the special and OJT trainees were similar (Garrett, 1976). Both groups had completed high school and had successfully completed two or more drafting courses in post-secondary institutions before entering their respective training program.

Unlike the OJT trainees who were placed in existing vacancies, the special trainees were not assured of placement at the end of training. Special trainee performance and degree of skill development were two important criteria used in determining future employment, according to Garrett (1976). Both groups were paid during training.

Training experiences varied between the trainee groups. The special trainees received training in a non-traditional Special Drafting Training Program. OJT trainees were trained in a traditional On-the-Job Drafting Training Program.

The special program was an 8-hours-per-day, 5-days-per-week laboratory setting devoted entirely to training. The training instructor had no work requirement other than training the special program participants. Under OJT, a trainee is assigned to an experienced worker or trainer. The time actually devoted to training is determined by the work load of the trainer. On many occasions the trainee is a passive observer as the trainer completes his/her work responsibility.

The populations were selected for the following reasons:

1. Engineers and supervisory personnel were involved in the overall drafting projects, they were experienced individuals who were thoroughly familiar with TVA Drafting Standards, and they submitted work for the special trainees and/or the OJT trainees.

2. OJT and special trainees were selected because of their participation in the drafting programs during the same period of time.

3. The populations were accessible and manageable.

Survey Procedures

The study took the form of descriptive survey research, a method of collecting evidence about an existing situation. Such research may rely on oral interview or self-administered written quesionnaire response. The latter was used for the following reasons:

1. Written questions are consistent, not only in form and content, but in presentation.

2. Written questionnaires isolate respondents from personal contact, thus providing a feeling of anonymity. This was particularly important in this investigation because of boss-employee pressures. Respondents (employees) may feel a need to highly rate the training programs and experiences because the study was sanctioned by the organization.

3. Administering written questionnaires was less complicated and less disruptive at the work station than oral interviewing.

4. The results could be easily recorded for data analysis.

Questionnaire Development. Two author-designed questionnaires were developed to sample respondent attitudes and perceptions based on the questions framed in the problem statement.

Initially, the items were ordered to correspond to the research questions but results from field testing, discussed later, provided the final forms.

Certain aspects of the original design remained after field testing. For example, in the engineer and supervisor questionnaire, an item asking to rate special trainee performance in certain categories

was immediately followed by an item to rate OJT trainees on the same categories.

Grouping of items was accomplished largely through field testing. The content and structure of both questionnaires were checked by a variety of people, including drafting instructors, educators, and industrial personnel. They were instructed to note any problems with clarity, bias, relevancy, readability, duplication, and negation (Babbie, 1973, pp. 141-145). Individuals involved in the field tests were told the purpose and intent of the survey. Background information on the special and OJT drafting training programs was also presented.

Field tests were conducted in two phases. Phase one included the following individuals:

1. One full-time and two part-time drafting instructors at the community college level.

2. TVA training personnel including the training director and an experienced draftsperson who had worked with OJT trainees in the past.

3. Approximately 20 graduate students who were enrolled in a curriculum and instruction course.

4. A professional editor with a survey research background.

These people were selected because of their background in teaching drafting, knowledge of TVA Drafting Standards, teaching and working with students of diverse ability, or experience with language structure and communication.

The second phase was implemented after the questionnaires

were reworked according to results from phase one. Persons involved in phase two included:

1. Approximately twelve graduate students who were enrolled in an evaluation course.

2. A professor of education whose specialty is research.

3. A professional editor with a survey research background.

Phase two participants were selected because of their teaching experience, knowledge of evaluation, expertise in research methods and procedures, or written communication expertise.

The two questionnaires used in this study were shaped and written to reflect the results from the field tests. Contents of the survey instruments are examined below.

Engineer and Supervisor Questionnaire. The questionnaire contained ten closed-end items and one opened-end item. A Likert scale with five response categories, one to five, was used for the first nine items (Babbie, 1973, p. 269). Item ten was a multiple-choice item with four response categories. Items one, and four through seven contained two separate response categories. Items two and three included five answer categories, while eight and nine contained four.

Answers were sought to the following sub-questions framed in the problem statements:

1. What similarities and differences existed in the quality of work performed by participants in the two types of training programs?

2. What similarities and differences existed between both trainee groups with respect to number of errors appearing in completed work, their ability to conform to TVA Drafting Standards, their ability

to follow instructions, reproductive quality of completed work, and length of time required for changes and redraws?

3. Trainees from which program were most preferred as future employees by engineers and supervisors?

In order to provide these answers, the questionnaire included the following questions about both trainee groups:

1. How difficult were the changes and redraws submitted by engineers and supervisors?

2. What was the quality of lines, lettering, symbols, work in plastic lead, and work in ink judged by the respondents?

3. What was the number of errors found in completed or turned-in work?

4. Did the work conform to TVA Drafting Standards?

5. How well did the trainees follow instructions?

6. What was the reproductive quality of completed work?

7. How long would respondents expect the trainees to take to complete simple and complex changes and redraws?

8. Which groups was most preferred as future employees?

The last item on the questionnaire asked for additional comments.

Trainee Questionnaire. The questionnaire contained seventeen items, sixteen closed-end and one opened-end item. Items one and two were information items containing two and four response choices respectively.

For the remaining fourteen items, multiple-choice items with four categories, "a" to "d," were developed. A positive response was

shown at "a" while "d" represented the negative end.

Answers to the following sub-questions framed in the problem statement were sought:

1. What similarities and differences existed between the training programs in terms of organization, use of time, preparation and agreement for work after training, and mastery of TVA Drafting Standards?

2. What similarities and differences existed between the training programs with respect to instructional variables such as teacher effectiveness and availability, use of methods, and evaluations?

3. What similarities and differences existed between the training programs with respect to the quality of overall instruction and training?

In order to provide these answers, the questionnaire included the following questions about both trainee groups:

1. How well was the training period organized?

2. Was the training time well spent?

3. How prepared were the trainees to assume additional duties and responsibilities after training?

4. Was there agreement between training and present work?

5. How much time, during training, was devoted to improvement of drafting skills?

6. During training, were clear explanations given on important drafting points?

7. How free did the trainee feel to seek help or assistance?

8. What was the interest level of the training instructor in teaching?

9. How available was the training instructor to provide assistance?

10. Was the lecture the principle teaching method?

11. Did the training instructor provide written evaluations during training?

12. How did the trainees feel about the teaching methods used during training?

13. What rating did the overall instruction receive?

14. How did the trainee rate his/her overall training experience?

The last item on the questionnaire asked for additional comments.

Administration of Questionnaires. Questionnaires were administered and collected by TVA's training officer. The engineer and supervisor questionnaire was administered two weeks after the completion of the special and OJT programs. OJT and special trainees received the trainee questionnaire six months after the completion of both training programs. The six month period was selected at the suggestion of TVA's training director.

For both questionnaires, each member of the population was handed a questionnaire packet at his work station. The packet contained a questionnaire and an envelope addressed to the training director for inter-agency mail delivery. Respondents were told to

carefully read directions, and to complete and return the answered questionnaire in a sealed envelope within three days. Respondents were not required to identify themselves.

Since the trainee questionnaires were identical, those administered to OJT trainees were marked with a small ink check mark at the top right corner on the back of each page. Respondents were informed of the mark and its purpose.

The returned questionnaires were mailed to the writer one week after distribution to respondents. This was enough time for the inter-agency mail to go full cycle. There were no late returns.

D. ANALYSIS AND TREATMENT OF DATA

An integral part of survey research is data analysis and treatment. In this study, most of the data were analyzed and portrayed similarly for both questionnaires.

With the exception of opened-end items and item ten on the engineer and supervisor questionnaire, all item categories were ordered to show positive responses first.

A Likert scale with five response categories, one to five, was used for all items on the engineer and supervisor questionnaire except item ten and an opened-end item. Item ten was a multiple-choice item with four response categories.

Multiple-choice items with four response categories, "a" to "d," were the dominate feature for closed-end items on the trainee questionnaire. An "a" represented the positive end and a "d" the negative end. A "yes" or "no" response was required for item one.

The last item was opened-ended.

Percentage ratios were used for all items in both questionnaires. Percentage values were reduced or increased to the nearest whole numbers.

As suggested by Loether and McTavish (1975, pp. 185-192), data were analyzed and treated according to their direction and nature of association. Direction of association is used to compare the way percentages run in a distribution by noting the highest percentage for each comparison. In this study, for example, directions of association were noted between the two trainee groups according to the highest percentage recorded for rating categories portrayed in the tables. The nature of association shows patterns of concentrations in a distribution and illuminates the categories which receive the highest ratings.

Tables and written narratives were used to portray data. All tables show frequency of responses for each rating group, total frequencies (total number of respondents), percentage ratio for each rating category, and total percentages.

E. SUMMARY

Answers to the questions framed in the problem statement were provided through the use of two author-designed questionnaires. One, administered to engineers and supervisors, investigated work performance of both trainee groups. The second questionnaire was administered to the special and OJT trainees. Both questionnaires sampled respondent attitudes and perceptions.

The study sought responses from total populations of three groups: engineers and supervisors, trainees who completed the Special Drafting Training Program, and trainees who completed the On-the-Job Drafting Training Program.

Questionnaires were received by twenty-six employees. Of the total, twelve were engineers and/or first line supervisors, eight were special and six were OJT trainees. A 100% return was realized.

After administration by TVA's training director, completed questionnaires were returned by respondents in sealed envelopes. Identification of respondents was not required.

The engineer and supervisor questionnaire was administered two weeks after the completion of the two training programs. OJT and special trainees received the trainee questionnaire six months after the completion of the training programs.

Answers from both questionnaires were recorded and tabulated for statistical purposes.

The statistical methods used throughout the study were the percentage ratio and percentage distributions.

Data were portrayed through the use of tables, accompanied by written explanations.

CHAPTER IV

ANALYSIS AND INTERPRETATION OF DATA

A. INTRODUCTION

Survey data from both questionnaires were analyzed and interpreted to respond to the questions framed in the problem statement.

Percentage distributions (Tate, 1965; Champion, 1970; and Loether and McTavish, 1974) were used for both questionnaires.

For the sake of clarity, results of the engineer and supervisor questionnaire will be presented first, followed by results of the trainee questionnaire.

B. ENGINEER AND SUPERVISOR QUESTIONNAIRE

An author-designed questionnaire was administered to twelve engineers and supervisors within two weeks after the completion of the special and OJT training programs. A return of 100% was realized. All closed-end items were answered completely and 50% of the returned questionnaires contained written comments.

Each questionnaire item was analyzed and tabled separately with the exception of items two, three, eight, and nine. Items two and three and items eight and nine were combined.

In all tables, the item rating categories, trainee group, frequency of response for each item rating category, percentage, and sum of frequencies and percentage distribution are shown. Percentages were rounded (beginning with lowest rating first) to the nearest whole number so that total percentages equalled 100.

Table 1 shows data on the difficulty of changes and redraws which engineers and supervisors submitted to special and OJT trainees. The table was placed here to show at the outset that respondents felt that the work submitted to both trainee groups was of average or near average difficulty. Engineers and supervisors perceived that 17% (2 of 12) of the changes were difficult, 75% (9 of 12) were average, and only 8% (1 of 12) were easy. All twelve respondents (100%) felt that redraws were of average difficulty.

Table 1. Difficulty of Changes and Redraws Submitted for Completion by Trainee Groups as Perceived by 12 Engineers and Supervisors

	Difficulty of Changes		Difficulty of Redraws	
	f	%	f	%
Very Difficult	0	0	0	0
Difficult	2	17	0	0
Average	9	75	12	100
Easy	1	8	0	0
Very Easy	0	0	0	0
	12	100	12	100

Answers to the problem question "What similarities and differences existed in the quality of work performed by participants in the two types of training programs?" are shown in Table 2.

Table 2 presents data on perceptions by engineers and supervisors on the quality of work performed by both trainee groups in five categories. The categories were line quality, lettering quality, symbol (arrowheads and numbers) quality, quality of work in plastic lead, and ink work. Line work quality for special trainees was concentrated in the good rating category, while OJT work was

concentrated in the average rating category. One of twelve (8%) respondents felt that special trainees performed very good line work, while ten of twelve (83%) felt that work was good, and one of twelve (9%) perceived the work to be of average quality. OJT trainees were perceived as performing 17% (2 of 12) good, 75% (9 of 12) average, and 8% (1 of 12) poor quality work. In the good rating category, the special trainees out performed OJT trainees by ten responses to two responses (83% to 17%) or by a five to one ratio. When the top two categories (very good and good) were combined, the special group registered eleven responses to two responses (91% to 17%) for the OJT group.

Differences between the training groups were perceived to be not as great for lettering work as in the other four categories. Respondents perceived that 8% (1 of 12), 33% (4 of 12), and 59% (7 of 12) of the work completed by special trainees were of very good, good, and average quality respectively. The OJT trainees were perceived to have completed 17% (2 of 12) good, 75% (9 of 12) average, and 8% (1 of 12) poor quality work. The engineers and supervisors favored the special trainees by a five to two (5 responses to 2 responses) margin over OJT trainees when the very good and good rating categories were combined.

Engineers and supervisors showed a strong preference for the quality of symbol (arrowheads and numbers) work completed by special trainees over OJT trainees. The twelve respondents perceived that the symbol work performed by the special participants was 83%

(10 of 12) good and 17% (2 of 12) average quality work, while OJT participants 8% (1 of 12) were perceived to have performed good, 83% (10 of 12) average, and 9% (1 of 12) poor quality work. In the good rating category, engineers and supervisors preferred the work of special trainees by a ratio of 10:1. The difference between the groups in the average rating category was nearly as great as in the good category. Only two of the twelve (17%) respondents perceived that symbol quality for special trainees was average and ten of the twelve (83%) respondents perceived that the OJT trainees completed average quality work (Table 2).

For the categories of plastic lead and ink work quality, the perceived differences between the trainee groups were not as dramatic as for symbol work. The twelve respondents perceived the quality of plastic work completed by special trainees to be 8% (1 of 12) very good, 75% (9 of 12) good, and 17% (2 of 12) average. The same respondents perceived OJT trainee work to be 16% (2 of 12) good, 67% (1 of 12) average, and 17% (2 of 12) poor.

The perceived differences between the groups for ink work were more dramatic than for plastic lead work. Over two thirds (1 of 12 or 67%) of the engineers and supervisors rated special work as good and only 17% (2 of 12) perceived OJT work as good quality. In the other rating categories, 16% (2 of 12) of the respondents perceived that special trainees performed very good ink work and 17% (2 of 12) felt the work was average. For OJT trainees, 33% (4 of 12) of the respondents perceived the work average in

Table 2. Perceptions of Engineers and Supervisors On The Quality of Work Completed by Special and OJT Trainees on Line Work, Lettering, Symbols (Arrowheads and Numbers), Plastic Lead Work, and Ink Work In Five Rating Categories.

	Lines				Lettering				Symbols				Plastic Lead				Ink			
Rating	Special		OJT		Special		OJT		Special		OJT		Special		OJT		Special		OJT	
Category	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Very Good	1	8	0	0	1	8	0	0	0	0	0	0	1	8	0	0	2	16	0	0
Good	10	83	2	17	4	33	2	17	10	83	1	8	9	75	2	16	8	67	2	17
Average	1	9	9	75	7	59	9	75	2	17	10	83	2	17	8	67	2	17	4	33
Poor	0	0	1	8	0	0	1	8	0	0	1	9	0	0	2	17	0	0	6	50
Very Poor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12	100	12	100	12	100	12	100	12	100	12	100	12	100	12	100	12	100	12	100

quality and 50% (6 of 12) felt the work was poor.

Answers to the problem question "What similarities and differences existed between the trainee groups with respect to number of errors appearing in completed work, their ability to conform to TVA Drafting Standards, their ability to follow instructions, reproductive quality of completed work, and length of time required for completion of changes and redraws?" are shown in Tables 3, 4, 5, 6, and 7.

Engineers and supervisors were asked to indicate the number of errors that tended to appear in work completed by special and OJT trainees. Table 3 reflects the perceptions of the respondents. Few differences in engineer and supervisor perceptions existed between the trainee groups in the number of errors appearing in completed work. All the respondents (12 of 12) perceived that special trainees committed from one to five errors while eleven of the twelve (92%) respondents perceived that OJT trainees had from one to five errors and one of the respondents (8%) perceived OJT trainees committed from six to ten errors.

Table 3. Number of Specific Errors, as Perceived by Engineers and Supervisors, That Appeared in Work Completed by Special and OJT Trainees

Number of Errors	Special		OJT	
	f	%	f	%
0	0	0	0	0
1-5	12	100	11	92
6-10	0	0	1	8
11-15	0	0	0	0
16 or More	0	0	0	0
	12	100	12	100

Table 4 shows perceptions of engineer and supervisory personnel regarding the extent to which both trainee groups met the requirements of TVA Drafting Standards. Overall, work performed by special trainees was perceived to conform more closely to TVA standards than did work by OJT trainees. Nine of the twelve respondents (75%) perceived that the work completed by special trainees followed the standards well and the remaining three respondents (25%) felt the work was in the average category. Engineers and supervisors perceived that OJT trainees followed the standards by ratios of 8% (1 of 12) well, 83% (10 of 12) average, and 9% (1 of 12) poorly. Trainee group comparisons show that the work of special trainees was preferred nine to one (9:1) over OJT trainees in the well category and three to one (3:1) in the average category.

Table 4. Perceptions by Engineers and Supervisors on the Extent to Which Trainees Met TVA Drafting Standards

	Special		OJT	
Category	f	%	f	%
Very Well	0	0	0	0
Well	9	75	1	8
Average	3	25	10	83
Poorly	0	0	1	9
Very Poorly	0	0	0	0
	12	100	12	100

Engineers and supervisors were asked to rate trainees on their ability to follow instructions. Table 5 shows the answers to the question. Respondents perceived that special trainees followed instruction very well 66% (8 of 12), well 17%

(2 of 12), and average 17% (2 of 12) of the time. OJT trainees were perceived to have followed instruction well 92% (11 of 12) and average 8% (1 of 12) of the time. The special group received higher marks than the OJT group in all rating categories. For example, in the rating categories of well and average, special trainees were judged to follow instruction by ratios of 11:2 and 2:1 respectively over OJT trainees.

Table 5. Engineers' and Supervisors' Perceptions On the Ability of Trainees to Follow Instructions

Rating Category	Special f	Special %	OJT f	OJT %
Very Well	8	66	0	0
Well	2	17	11	92
Average	2	17	1	8
Poorly	0	0	0	0
Very Poorly	0	0	0	0
	12	100	12	100

Table 6 shows perceptions by engineers and supervisors on the probable reproductive quality of work performed by each trainee group. Special trainee work was perceived to be considerably better than OJT trainee work. Eleven of the twelve (95%) respondents perceived that special trainees completed good reproductive quality work, while only two of the twelve (17%) presondents perceived OJT trainees quality to be good. In the average rating category, one of the twelve (8%) respondents felt that special trainees completed average quality work and ten of the twelve (83%) respondents felt that OJT trainees completed average quality work.

Table 6. Perceptions by Engineers and Supervisors On The Probable Reproductive Quality of Work Performed by Trainee Groups

Rating Category	Special		OJT	
	f	%	f	%
Very Good	0	0	0	0
Good	11	92	2	17
Average	1	8	10	83
Below Average	0	0	0	0
Poor	0	0	0	0
	12	100	12	100

Table 7 portrays engineer and supervisor perceptions on the period of time they would expect trainees to complete work on simple and complex changes and redraws. The period of time was one, two, three, four, or five or more months. There were few overall differences between the trainee groups in completing simple changes. Special trainees were perceived to master simple changes in one month by 50% (6 of 12) of the respondents, in two months by 33% (4 of 12) of the engineers and supervisors, and 17% (2 of 12) of the respondents felt it would require three months. During the same periods, 41% (5 of 12), 42% (5 o2 12), and 17% (2 of 12) of the respondents felt that OJT trainees would complete the changes in one, two, and three months.

Greater differences were perceived between the trainee groups in completing complex changes, simple redraws, and complex redraws. One third (4 of 12) of the engineers and supervisors perceived that special trainees would complete complex changes within one month.

Table 7. The Period of Time The Trainee Groups Would Be Expected to Complete Work on Changes and Redraws as Perceived by Engineers and Supervisors

Period of Time	Simple Changes				Complex Changes				Simple Redraws				Complex Redraws			
	Special		OJT		Special		OJT		Special		OJT		Special		OJT	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
1 Month	6	50	5	41	4	33	0	0	1	8	0	0	0	0	0	0
2 Months	4	33	5	42	6	50	2	16	6	50	8	66	8	66	2	16
3 Months	2	17	2	17	0	0	8	67	5	42	2	17	2	17	8	67
4 Months	0	0	0	0	2	17	2	17	0	0	2	17	2	17	2	17
5 Months or More	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	12	100	12	100	12	100	12	100	12	100	12	100	12	100	12	100

Half (6 of 12) of the respondents perceived that special trainees would complete complex changes within two months and only 16% (2 of 12) felt that OJT trainees would complete those changes in the same period. Engineers and supervisors (67%; 8 of 12) felt that most of the OJT trainees would take three months to complete work on complex changes. An equal number of respondents felt (17%; 2 of 12) that trainees from both groups would require four months to satisfactorily complete complex changes.

Simple redraw completion times were not as dramatic as complex changes but were perceived to still favor special trainees. Special trainees were perceived to complete simple redraws by 8% (10 of 12) of the respondents within one month, by 50% (6 of 12) of the respondents within two months, and 42% of the respondents within three months. OJT trainees were perceived to complete the same work at rates of 66% (8 of 12) within two months, 17% (2 of 12) within three months, and 17% (2 of 12) within four months.

Marked differences existed between the groups on the expected period of time to complete complex redraws. Two-thirds (8 of 12) of the engineers and supervisors felt that the trainees from the special group would complete complex redraws within two months and only 16% (2 of 12) felt the same for the OJT group. Equal numbers of respondents (17%; 2 of 12) perceived that special trainees would complete complex redraws in three or four months. Most of the respondents (67%; 8 of 12) perceived that OJT trainees would complete the work in three months. Seventeen percent (2 of 12) of the respondents perceived

that both trainee groups would require four months to complete complex redraws.

Answers to the problem question "Trainees from which program are most preferred as future employees by engineers and supervisors?" are shown in Table 8.

Respondents preferred the special trainees (66%; 8 of 12) over the OJT trainees (17%; 2 of 12) and the either group (17%; 2 of 12) category. When the OJT and either group categories are combined (4 of 12 responses), respondents preferred the special group by two to one (2:1).

Table 8. Trainee Group Most Preferred As a Source For Future Employees As Perceived by Engineers and Supervisors

Group	f	%
Special	8	66
OJT	2	17
Either	2	17
Neither	0	0
	12	100

Table 9 shows the data on the opened-end response asking for additional comments on the special and OJT training programs. Of the eighteen statements written, the special program received ten favorable responses (56%), the OJT program received two favorable responses (11%), and six items were neutral (33%). (See Appendix D for a list of the written statements.)

Table 9. Number of Written Comments By Engineers and Supervisors Favoring Special and OJT Training Programs

Group Favored	f	%
Special Program	10	56
Neutral Responses	6	33
OJT Program	2	11
	18	100

C. TRAINEE QUESTIONNAIRE

Six months after the completion of the special and OJT drafting training programs an author-designed questionnaire was administered to eight (8) special and six (6) OJT trainees. All questionnaires were returned. All closed-end items were answered and no additional comments were volunteered.

The last three questions framed in the problem statement were answered by the questionnaire.

1. What similarities and differences existed between the training program in terms of organization, use of time, preparation and agreement for work after training, and mastery of TVA Drafting Standards?

2. What similarities and differences existed between the training programs with respect to instructional variables such as teacher effectiveness and availability, use of methods, and evaluation?

3. What similarities and differences existed between the training programs with respect to the quality of overall instruction and training?

In all tables, rating category, frequency of responses for each rating category, and percentage ratio are shown by respondents. The tables represent responses for items three through sixteen. Tables 10 through 16 show data for questionnaire items three through nine. Table 17 shows data for items ten through thirteen and Table 18 shows data for items fourteen through sixteen. These items were combined because rating categories were the same.

Answers to the problem question "What similarities and differences existed between the training programs in terms of organization, use of time, preparation and agreement for work after training, and mastery of TVA Drafting Standards?" are shown in Tables 10 through 14.

Table 10 shows trainee perceptions regarding how well their training periods were organized. All special trainees (8 of 8) felt their training was well organized. Sixty-seven percent (4 of 6) of the OJT trainees felt their program was well organized, while 33% (2 of 6) felt it poorly organized.

Table 10. Trainee Perceptions Regarding The Organization of Their Training Periods

Rating Category	Special		OJT	
	f	%	f	%
Very Well Organized	0	0	0	0
Well Organized	8	100	4	67
Poorly Organized	0	0	2	33
Very Poorly Organized	0	0	0	0
	8	100	6	100

Trainee perceptions on the effective use of training time are shown in Table 11. OJT trainees did not feel as positive about the use of training time as did special trainees. OJT trainees (67%; 4 of 6) felt that their time was effectively used and 33% (2 of 6) of the time was unsatisfactorily used at times. Seventy-five percent (6 of 8) of the special trainees felt that their times was effectively used and 25% (2 of 8) felt the time was very effectively spent.

Table 11. Quality of Training Time As Perceived By Trainee Groups

Rating Category	Special		OJT	
	f	%	f	%
Very Effective	2	25	0	0
Effective	6	75	4	67
Unsatisfactory at Times	0	0	2	33
Not Satisfactory At All	0	0	0	0
	8	100	6	100

Table 12 illustrates trainee perceptions about how prepared they felt to assume additional duties and responsibilities after training. The majority of special trainees, 62% (5 of 8), felt very well prepared, while a minority of OJT trainees, 17% (1 of 6), felt the same. In the other rating categories, 25% (2 of 8) of the special trainees felt well prepared as opposed to 66% (4 of 6) of the OJT trainees, while only 13% (1 of 8) of the special trainees and 17% (1 of 6) of the OJT trainees felt poorly prepared.

Table 12. Feelings of Trainees About How Prepared They Felt to Assume Duties After Training

Rating Category	Special f	Special %	OJT f	OJT %
Very Well Prepared	5	62	1	17
Well Prepared	2	25	4	66
Poorly Prepared	1	13	1	17
Very Poorly Prepared	0	0	0	0
	8	100	6	100

The only area where OJT trainees felt better prepared than special trainees was in the agreement between training experiences and work duties after training. Table 13 shows that 83% (5 of 6) of the OJT trainees perceived a very close agreement between training and work after training compared to 33% (3 of 8) of the special trainees. Sixty-three percent (5 of 8) of the special trainees felt close agreement existed between their training and work after training, while 17% (1 of 6) of the OJT trainees felt the same.

Table 13. Perceptions of Trainees Regarding Agreement Between Training and Work After Training

Rating Category	Special f	Special %	OJT f	OJT %
Very Close Agreement	3	37	5	83
Close Agreement	5	63	1	17
Little Agreement	0	0	0	0
Very Little Agreement	0	0	0	0
	8	100	6	100

Table 14 shows trainee perceptions on the amount of training time spent on improving skills and mastering TVA's drafting standards. Two of the eight (25%) special trainees felt that all of their time was devoted to skill development and learning TVA's standards. The remaining six trainees (75%) felt that almost all of the time was spent on the two areas.

OJT trainees felt differently. Thirty-three percent (2 of 6) perceived that almost all of their time and 67% (4 of 6) felt that half of their time was devoted to developing skills and learning TVA's drafting standards.

Table 14. Amount of Time Spent During Training On Improving Drafting Skills and Learning TVA's Standards as Perceived by Trainees

Rating Category	Special		OJT	
	f	%	f	%
All of My Time	2	25	0	0
Almost All of My Time	6	75	2	33
Half of My Time	0	0	4	67
Less Than Half of My Time	0	0	0	0
	8	100	6	100

The following three tables show perceptions of the trainees to the problem question of "What similarities and differences existed between the training programs with respect to various instructional activities such as teacher effectiveness and availability, use of methods, and evaluations?"

Perceptions by special and OJT trainees about the clarity of explanations provided by instructors on important features of TVA Drafting Standards are presented in Table 15. Respondents were asked to rate

whether explanations were always, almost always, sometimes, or rarely provided. Special trainees felt that clear explanations were always given 63% (5 of 8) and almost always given 37% (3 of 8) of the time. OJT trainees felt that clear explanations were provided almost always 67% (4 of 6) and sometimes 33% (2 of 6) of the time.

Table 15. Clarity of Explanations About Important Points or Ideas That Related to TVA Drafting Standards as Perceived by Both Trainee Groups

Rating Category	Special f	Special %	OJT f	OJT %
Always	5	63	0	0
Almost Always	3	37	4	67
Sometimes	0	0	2	33
Rarely	0	0	0	0
	8	100	6	100

Respondent feelings regarding their freedom to seek instructor assistance on problems with work are illustrated in Table 16. Seventy-five percent (6 of 8) of the special trainees and 17% (1 of 6) of the OJT trainees always felt welcome to seek assistance. The remaining special trainees, 25% (2 of 8), often felt welcome to ask for help, while two-thirds (4 of 6) of the OJT participants often felt welcome to seek instructor assistance. Finally, one OJT trainee (17%) sometimes felt hesitant to seek assistance or ask for help on work related problems.

Table 16. Trainee Perceptions Regarding Their Feelings To Seek Assistance From Training Supervisor (Instructor) When Problems Occur

Rating Category	Special		OJT	
	f	%	f	%
Always Felt Welcome	6	75	1	17
Often Felt Welcome	2	25	4	66
Sometimes Felt Hesitant	0	0	1	17
Often Felt Hesitant	0	0	0	0
	8	100	6	100

Table 17 illustrates perceptions by both trainee groups in four areas. These areas include a) the effectiveness of the instruction during training, b) instructor availability for presenting new information and assignments as well as answering questions, c) instructional methods used during training, and d) frequency of written evaluations used in both training programs.

In terms of the effectiveness of the instruction received by the trainees, 50% (4 of 8), 37% (3 of 8), and 13% (1 of 8) of the special trainees felt that the instruction was always, almost always, and sometimes effective. For the same areas, OJT trainees felt that 17% (1 of 6), 50% (3 of 6), and 33% (2 of 6) of the instruction was always, almost always, and sometimes effective.

The availability of the instructor was perceived to have been much more pronounced in the special program than in the OJT program. Seven of the eight (87%) special trainees compared to one of the six (17%) OJT trainees felt that the instructor was always available. Accord-

Table 17. Special and OJT Trainee Perceptions About a) Effectiveness of Instruction Received, b) Availability of Instructor to Answer Questions, Give Assignments, and Provide New Information, c) Use of Teaching Methods Other Than Lecture, and d) Use of Written Evaluations on Trainee Progress During Training

Rating Category	Effectiveness of Instruction				Availability of Instructor				Teaching Methods				Written Evaluation			
	Special		OJT		Special		OJT		Special		OJT		Special		OJT	
	f	%	f	%	f	%	f	%	f	%	f	%	f	%	f	%
Always	4	50	1	17	7	87	1	17	3	37	0	0	5	63	0	0
Almost Always	3	37	3	50	1	13	4	66	2	25	1	17	3	37	3	50
Sometimes	1	13	2	33	0	0	1	17	3	38	5	83	0	0	3	50
Rarely	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	8	100	6	100	8	100	6	100	8	100	6	100	8	100	6	100

ing to one of the eight (13%) special and four of the six (66%) OJT trainees the instructor was almost always accessible. Only one of the six (17%) OJT trainees felt that the instructor was sometimes available.

OJT trainees perceived the lecture method of presenting material as having been used more requently in their training program than did special trainees. Trainees were asked to rate the use of teaching methods other than the lecture method used in their training programs. OJT trainees felt that methods other than lecture were sometimes used 83% (5 of 6) or almost always used 17% (1 of 6) of the time. While special trainees felt that other methods were used always 37% (3 of 8), almost always 25% (2 of 8), and sometimes 38% (3 of 8) of the time.

The last area in Table 17, the use of written evaluations to show trainee progress, strongly favored the special program. Sixty-three percent (5 of 8) of the special trainees perceived that written evaluations were always used in their program and no OJT trainee perceived the same. Thirty-seven percent (3 of 8) of the special trainees perceived that written evaluations were almost always used. OJT perceptions about the use of written evaluations were equally divided between almost always and sometimes used (50%; 3 of 6).

Perceptions of trainees to the last problem question are shown in Table 18. Trainees were asked to rate the overall quality of methods, instruction, and training used or received during their training periods from excellent to poor. One of the eight (13%) special trainees per-

ceived the overall use of teaching methods, two (25%) perceived instruction, and three (37%) perceived training received as excellent. The only area perceived by OJT trainees as excellent was teaching methods, (17%; 1 of 6). Eighty-seven percent (7 of 8), 75% (6 of 8), and 63% (5 of 8) of the special trainees perceived methods, instruction, and training as good. OJT trainees rated methods (33%; 2 of 6), instruction (83%; 5 of 6), and overall training (67%; 4 of 6) as good.

Lastly, below average ratings were given by OJT trainees for use of teaching methods (50%; 3 of 6), instruction (17%; 1 of 6), and training received (33%; 2 of 6).

Table 18. Perceptions of Trainees Regarding the Quality of a) Teaching Methods Used, b) Overall Instruction Offered, and c) Overall Training Provided in Their Respective Training Programs

	Teaching Methods				Overall Instruction				Overall Training			
Rating Category	Special		OJT		Special		OJT		Special		OJT	
	f	%	f	%	f	%	f	%	f	%	f	%
Excellent	1	13	1	17	2	25	0	0	3	37	0	0
Good	7	87	2	33	6	75	5	83	5	63	4	67
Below Average	0	0	3	50	0	0	1	17	0	0	2	33
Poor	0	0	0	0	0	0	0	0	0	0	0	0
	8	100	6	100	8	100	6	100	8	100	6	100

D. SUMMARY OF FINDINGS

Engineer and Supervisor Questionnaire

Responses of engineers and supervisors strongly favored participants in the special program in several ways. According to

engineers' and supervisors' perceptions, special trainees:

a) completed better quality line work, symbols (arrowheads and numbers), plastic lead work, and work in ink,

b) met the requirements of TVA Drafting Standards better,

c) followed instructions better,

d) performed better reproductive quality work, and

e) required less time to complete work on complex changes and complex redraws than did OJT trainees.

Engineers and supervisors did not favor OJT trainees over special trainees in any area.

Trainee Questionnaire

Trainee perceptions showed strong preferences for the special program in eight areas and one area for the OJT program.

The special program was perceived to:

a) better prepare trainees for work after training,

b) provide more time for skill development,

c) offer clearer explanations on TVA's drafting standards,

d) provide more freedom for trainees to ask questions or seek assistance,

e) have more effective instruction,

f) include greater teacher availability,

g) provide more written evaluations, and

h) offer better overall teaching methods than did the OJT program.

The only area where the OJT program was perceived to be better

than the special program was in the close relationship between training experiences and work after training.

CHAPTER V

CONCLUSIONS, DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

A. CONCLUSIONS

An analysis of the results from the questionnaires served as a basis for evaluating the Special Drafting Training Program compared to the On-the-Job Drafting Training Program. The following conclusions were based on the findings from the engineer and supervisor questionnaire.

1. The special trainees were perceived by engineers and supervisors to have completed better quality work than did OJT trainees on 1) lines, 2) symbols, 3) plastic lead, and 4) ink during training.

There was a marked difference of opinion between the trainee groups in the four areas above.

1) Ten of the twelve respondents (83%) perceived that special trainee line quality was good, while 17% (2 of 12) perceived that OJT trainee line quality was good; 19% (1 of 12) perceived that special trainee and 75% (9 of 12) perceived that OJT trainee line quality was average.
2) For symbols work, 83% (10 of 12) perceived special quality was good and only 8% (1 of 12) of the respondents perceived OJT quality as good. The perceptions were almost reversed for average quality work, 17% (2 of 12) for special to 83% (10 of 12) for OJT trainees.

3) Plastic lead quality also favored special trainees. Engineers and supervisors perceived by a margin of nine to twelve (75%) that the special group had good quality plastic lead work, while two of the twelve respondents (16%) rated the OJT group as having good quality work. Seventeen percent (2 of 12) of the respondents rated special work as average and 67% (8 of 12) of the respondents rated OJT work as average quality.

4) Engineer and supervisory perceptions were more strongly in favor of special trainee work in ink quality than in other areas. Sixty-seven percent (8 of 12) perceived that special trainee quality in ink was good and 17% (2 of 12) perceived that OJT trainee quality in ink was good. Near the other extreme, 50% (6 of 12) perceived OJT ink quality poor while no one perceived special quality as poor. Special trainees ranged from very good (16%) to average (17%) and OJT trainees ranged from good (17%) to poor (50%).

2. When questioned two weeks after the completion of training, engineers and supervisors indiciated special trainees met the requirements of TVA's drafting standards better than OJT trainees.

When engineers and supervisors were asked to determine the extent to which trainees met TVA Drafting Standards, they favored the special trainees. Seventy-five percent (9 of 12) perceived that special trainees met the standards well as opposed to 8% (1 of 12)

for OJT trainees in the well rating category. In the average rating category, special trainees received a 25% (3 of 12) rating and OJT trainees received an 83% (10 of 12) rating.

3. Special trainees followed instructions better than OJT trainees during training according to perceptions of engineers and supervisors.

A majority of respondents, eight of twelve (66%), perceived that special trainees followed instructions very well. OJT trainees received no responses in the very well category. Responses were nearly reversed in the well category; 17% (2 of 12) of the respondents perceived special trainees followed instruction well, while 92% (11 of 12) felt OJT trainees followed instruction well.

4. According to engineers' and supervisors' perceptions, special trainees completed better reproductive work than OJT trainees.

Eleven of the twelve (92%) respondents rated special quality as good, while two of the twelve (17%) respondents rated OJT quality as good. Special trainee reproductive quality was rated average by 8% (1 of 12) of the respondents. OJT trainees were perceived to have completed average reproductive quality by 83% (10 of 12) of the respondents.

5. The special trainees were perceived by engineers and supervisors to be better future employees than OJT trainees.

When egineers and supervisors were asked from which group they would most likely prefer to select employees, they preferred

special trainees by a strong margin. Eight of the twelve (66%) respondents preferred special trainees and only two of twelve (17%) preferred OJT trainees. For the remaining responses, two of the twelve (17%), respondents expressed no preference (either group).

Most of the results of the questionnaires given to the trainees themselves similarly indicated the superiority of the special training program over OJT.

6. Responses from the special and OJT trainees suggested that the special program better prepared trainees to assume work duties after training.

Sixty-two percent (5 of 8) of the special trainees felt very well prepared for work after training, while only 17% (1 of 6) of the OJT trainees felt very well prepared. Two of the eight (25%) special trainees and four of the six (66%) OJT trainees felt well prepared for the job after training. Only 13% (1 of 8) of the special trainees and 17% (1 of 6) of the OJT trainees felt poorly prepared.

7. Trainees perceived that the OJT training program was more closely related to work after training than the special training program.

When trainees were asked to rate the extent of agreement between their training experiences and their work after training, 83% (5 of 6) of the OJT trainees perceived very close agreement, while only 37% (3 of 8) of the special trainees felt the same. Close agreement between training and work after training was perceived by 63% (5 of 8) of the special and 17% (1 of 6) of the

OJT trainees.

8. More time was spent on improving drafting skills and learning TVA Drafting Standards in the special program than in the OJT program, according to trainee perceptions.

A fourth (2 of 8) of the special trainees and no OJT trainees felt that all of their time was devoted to skill improvement and learning TVA's standards. For the rating category of almost all my time, 75% (6 of 8) of the special and 33% (2 of 6) of the OJT trainees marked this category. The remaining OJT trainees, four of six or 67%, perceived that only half of their time was spent on developing skills and learning drafting standards.

9. Explanations about drafting standards were better presented in the special program than in the OJT program, according to trainee perceptions.

Nearly two-thirds, 63% (5 of 8), of the special trainees felt that clear explanations were always given, while no OJT trainee felt the same. Sixty-seven percent (4 of 6) of the OJT and 37% (3 of 8) special participants perceived that clear explanations were almost always provided. Clear explanations were given sometimes according to 33% (2 of 6) of the OJT trainees.

10. The Special Drafting Training Program was perceived by trainees to provide a greater feeling of freedom for trainees to ask questions.

11. According to trainee perceptions, instruction was more effective in the special program than in the OJT program.

On the trainee questionnaire item asking trainees to rate the effectiveness of instruction received, special trainees perceived that their instruction was always (50%), almost always (37%; 3 of 8), or sometimes (13%; 1 of 8) effective. OJT trainees perceived that instruction was always (17%; 1 of 6), almost always (50%), or sometimes (33%; 2 of 6) effective during training.

12. The availability of the instructor to assist trainees was greater in the special program than in the OJT program, according to trainee perceptions.

Nearly all, seven of eight or 87%, of the special trainees felt that the instructor was always available, while only one of six or 17% of the OJT trainees felt the instructor was always available to answer questions, give assignments, or provide new information. Two-thirds, four of six, of the OJT and 13%, one of eight, of the special trainees perceived that the instructor was almost always available.

13. Trainees perceived that evaluative methods in determining trainee progress were better in the special program than in the OJT program.

The use of evaluations on trainee progress during training were felt to have always been given by five of eight (63%) of the special trainees. Slightly more than a third (3 of 8; 37%) of the special and half (3 of 6) of the OJT trainees felt that evaluative methods were almost always conducted. The remaining OJT trainees (3 of 6)

felt that evaluations were sometimes used in determining their progress.

14. The overall teaching methods used during the special training program were better than the overall teaching methods used in the OJT training program, according to perceptions of trainees.

One of the eight, 13%, special and one of the six, 17%, OJT trainees perceived that the quality of teaching methods used during training were excellent. But, 87% (7 of 8) of the special and 33% (2 of 6) of the OJT trainees rated teaching methods good. The only other rating category receiving responses was below average. In this category, 50% of the OJT trainees felt the methods used during their training was below average; no special trainees felt the same.

B. DISCUSSION

A review of the findings which led to the conclusions require some additional explanation.

Statistical results were considered significant (strong preferences, wide margins, etc.) only when extreme differences were indicated. Extreme was defined as the selection of a point on the opinion (response) scale (very good, good, average, etc.) by 50% or more of the respondents in any group on any questionnaire item. Also, if 50% or more of the respondents selected the same rating category for an item, results were not considered significantly different in favor of either group. For example, if 75% of the engineers and supervisors perceived that special trainees completed good (rating

category) quality line work and 63% felt that OJT trainees also completed good quality line work, the item was judged to favor neither trainee group. This treatment was chosen because of the small number of respondents.

For example, in Table 2, the highest percentage ratings recorded for special and OJT trainees in all areas (lines, lettering, etc.) were noted. Only ratings of 50% and above, under a specific area, qualified for notation in any area. An example of the 50% rule appeared in Table 7. The highest percentage in one of the five rating categories received by special trainees under the area of simple changes was 50% and the highest for OJT trainees was 42%, so, under the 50% rule, simple changes were not considered as significant evidence in favor of either group.

Also, if the highest percentage rating for both trainee groups appeared in the same rating category, the area was not counted as significant. Again, in Table 2, the highest rating for lettering work completed by the trainees was in the average rating categories. It could be argued that by combining the very good and good rating categories, special trainees were perceived to have completed better quality lettering work, almost twice as good, 42% (5 of 12) to 17% (2 of 12), as OJT trainees. However, the data were treated the same throughout the study to yield the conclusions.

Why were differences in perceptions between the trainee groups not consistently as great in various areas such as lettering (Table 2) or changes (Table 7)?

Table 2 showed that special trainees, as perceived by engineers and supervisors, performed better work on lines, on symbols, in plastic lead, and in ink than did OJT trainees, but no significant differences were noted on lettering work. Table 7 indicated the special trainees required significantly less time to complete complex changes and redraws than did OJT trainees, but no differences were shown for simple changes and redraws.

A two part answer is required to respond to the apparent discrepancies in the two tables.

1. Drafting is a language used to communicate a real thing, an idea, or a design for later construction or manufacture. Like most written language, drafting requires order, definition, and legibility. Standards are high. Drafting performance varies from individual to individual. Some people draw higher quality lines more quickly than others. Experience indicates that many drafting students have a more difficult time mastering lettering than drawing quality lines or symbols. Quality work comes with constant practice and experience.

2. Generally, according to TVA standards, simple changes and redraws require less time and expertise to complete than do complex changes and redraws. Because of this, practice is needed to improve efficiency and quality over time.

The only area where the OJT training program fared better than the special program was in trainee perceptions on the agreement between training, Table 14. This result was not surprising because the special program could only simulate the actual work environment as nearly as possible, where as OJT trainees were in their actual work environment.

Nardone (1976, p. 17) and others indicate that on-the-job training is the most common type of training found in business and industry. Why is it, then, in view of the conclusions of this study, that business and industry rely heavily on OJT to train employees? The answer may be due, in part, to a number of factors:

1. A lack of information in the scholarly literature on industrial training,

2. A lack of effective educational programs that evaluate as well as train industrial personnel, or

3. The isolation of industrial trainers from the latest findings on industrial training.

The success of the special trainees may have been largely due to the special drafting training program itself, rather than the individual instructor, although it is acknowledged that results may vary somewhat with various instructors.

The special program took place in a 40-hours-per-week laboratory setting devoted entirely to training over a three month period. Unlike the OJT program, the training instructor worked full-time training the special program participants. This format provided continuous practice and concentrated drafting experience for the trainees. The literature shows (Chowenhill, 1973, p. 26 and others) that improved drafting skills come with constant practice and work experience. This point was also supported by the findings of this study (Table 15). In Table 15, most of the special trainees (6 of 8; 75%) perceived that almost all of their time was spent on improving skills, while most of the OJT trainees (4 of 6; 67%) perceived that half of their time was

spent on skill improvement. Of the remaining responses, 25% (2 of 8) of the special trainees felt that all of their time was devoted to improving skills and 33% (2 of 6) of the OJT trainees felt that improving skills occupied almost all of their time.

Additionally, the special program was designed to continuously monitor the progress of each trainee. Trainee strengths and weaknesses were quickly identified. Trainees were given individual prescriptions to strengthen weaknesses. Trainee perceptions, Table 18, indicated that evaluations on trainee progress were better in the special program than in the OJT program.

Finally, motivation on the part of special trainees may have played a major role in shaping the success of the special program. This is plausable considering the status of the special trainees during training. Special trainees were not assured of placement at the end of the training period. OJT trainees, on the other hand, filled existing vacancies. Special participants knew that good performance during training was an important factor in determining future employent. The investigator observed that the special trainees were highly motivated and wanted to succeed on every task. They were extremely interested in their progress throughout the training period. The same enthusiasm and high motivation also were observed in a recent training program for welders designed by the researcher. These individuals were employed by the company sponsoring the program. Successful completion of the program meant an increase in pay along with job classification changes providing greater future opportunities. It is

quite possible that the prospect of future security or a promotion may have been an important motivating factor in special trainee success.

C. IMPLICATIONS

Industrial training is and probably will continue to be an industry function rather than becoming a function of public education. Some of the reasons for this situation include the following:

1. Employment patterns in industry are often erratic and do not always correspond to scheduling calendars of educational institutions.

2. Educational faculty and facilities are often limited and committed to regular courses or programs. Flexibility to accomodiate industrial training needs is limited.

3. Unfortunately, many vocational-technical laboratories are not outfitted with the latest "state-of-the-technology" equipment or machines found in industry.

4. Many vocational-technical institutions have policies which set minimum numbers of enrollees before a class or program is allowed to be offered. Unless industrial trainees equal or surpass those minimum numbers, public schools are unable to satisfy training needs of industry.

Assuming that training will continue to be a primary function of industry, several implications are proposed for public education.

1. Because of the cost, many industries do not maintain a complete staff of full-time instructors to carry out special programs

such as the one studied here. An industrial training department may consist of a full-time training director with limited staff or of an individual dividing his/her time between training functions and other duties. Public education, working in concert with industry, could provide experienced and qualified staff, as needed, to satisfy special training needs of industry.

2. Industrial educators, particularily those in area vocational schools and community colleges, should actively work toward establishing better and closer lines of communications with industrial training departments. Communication may be enhanced by educators becoming active in national and local industrial training societies or establishing and maintaining personal contact with local training departments. Benefits from closer communication may lead to a number of activities beneficial to both education and industry. Possible benefits to educational institutions include satisfying greater industrial training needs, becoming privy to current industrial practices for program improvement, and determining future employment trends. Industry could take advantage of educators' expertise in program development, testing, instructions, and evaluations.

3. Industrial education departments in teacher training institutions should provide specialized workshops for industrial training directors and trainers. The literature shows that many industrial training personnel are unaware of the procedures and methods necessary to develop, implement, or evaluate training programs.

D. RECOMMENDATIONS

A number of recommendations are formulated as a result of this study.

1. More comparative studies of various industrial training programs should be conducted.

2. Future studies should include economic comparisons between new and traditional training programs.

3. Curriculum development and evaluation methodology should be given greater attention by industrial training departments.

4. Area vocational-technical schools and community colleges should actively work with local industry in satisfying training needs.

5. The special training program format should be revised to include a measure of experience on the job site.

6. Considering the results of this study and the conclusions made, it is felt that industry should reconsider its training strategies, at least those teaching manipulative skills, and take advantage of the special drafting training program model.

7. Since this study was based on perceptions from a limited group of people, future studies should include a much larger number of respondents and participants.

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APPENDIXES

APPENDIX A

EVALUATION OF TRAINEE WORK PERFORMANCE

As a supervisor or engineer, you have either requested or checked changes and/or redraws submitted to the Special Drafting Training Program. The survey is designed to compare the work performance between the special trainees and that of On-the-Job (OJT) trainees. The special trainees are those employees who participated in the Special Drafting Training Program. OJT trainees are employees who were trained on the job. Individuals answering the questionnaire are reminded that both groups of trainees are at the SE-1 level of TVA's job scale. Please answer all questions in the space provided. Questions apply to your perceptions of the work performance of the two groups mentioned above.

1. How difficult do you consider the work you have required of all trainees? Please rate the difficulty as you perceive it for persons of an SE-1 level. Circle one number under a. and one under b.

   a. Difficulty of changes submitted to trainees.

Very Difficult	Difficult	Average	Easy	Very Easy
1	2	3	4	5

   b. Difficulty of redraws or tracing submitted to trainees.

Very Difficult	Difficult	Average	Easy	Very Easy
1	2	3	4	5

2. Please rate the quality of special trainees' work in the following categories. Circle only one number under each letter below.

   a. Lines.

Very Good	Good	Average	Poor	Very Poor
1	2	3	4	5

b. Lettering.

Very Good	Good	Average	Poor	Very Poor
1	2	3	4	5

c. Symbols (arrowheads and numbers).

Very Good	Good	Average	Poor	Very Poor
1	2	3	4	5

d. Work in plastic lead.

Very Good	Good	Average	Poor	Very Poor
1	2	3	4	5

e. Work in ink.

Very Good	Good	Average	Poor	Very Poor
1	2	3	4	5

3. Please rate the quality of OJT trainees' work in the following categories. Circle only one number under each letter below.

a. Lines.

Very Good	Good	Average	Poor	Very Poor
1	2	3	4	5

b. Lettering.

Very Good	Good	Average	Poor	Very Poor
1	2	3	4	5

c. Symbols (arrowheads and numbers).

Very Good	Good	Average	Poor	Very Poor
1	2	3	4	5

d. Work in plastic lead.

Very Good	Good	Average	Poor	Very Poor
1	2	3	4	5

e. Work in ink.

Very Good	Good	Average	Poor	Very Poor
1	2	3	4	5

4. How many specific errors tended to appear in work completed by trainees? Please circle one number in a. and one in b. below.

   a. Special trainees.

0 Errors	1-5 Errors	6-10 Errors	11-15 Errors	16 or more Errors
1	2	3	4	5

   b. OJT trainees.

0 Errors	1-5 Errors	6-10 Errors	11-15 Errors	16 or more Errors
1	2	3	4	5

5. To what extent have each of the two types of trainees met TVA Drafting Standards? Please circle one number in a. and one in b. below.

   a. Special trainees.

Very Well	Well	Average	Poorly	Very Poorly
1	2	3	4	5

   b. OJT trainees.

Very Well	Well	Average	Poorly	Very Poorly
1	2	3	4	5

6. How well did trainees follow your instructions? Please rate each group. Circle one number in a. and one in b. below.

   a. Special trainees.

Very Well	Well	Average	Poorly	Very Poorly
1	2	3	4	5

   b. OJT trainees.

Very Well	Well	Average	Poorly	Very Poorly
1	2	3	4	5

7. Please rate the probable reproduction quality of work performed by each group. Circle one number in a. and one in b. below.

   a. Special trainees.

Very Good	Good	Average	Below Average	Poor
1	2	3	4	5

b. OJT trainees.

Very Good	Good	Average	Below Average	Poor
1	2	3	4	5

8. Please indicate the period of time you would expect special trainees to perform the following changes and redraws. Circle one number under each letter below.

a. Simple changes (changes not requiring title block addition).

1st Month	2nd Month	3rd Month	4th Month	5th Month and Beyond
1	2	3	4	5

b. Complex changes (changes requiring title block addition).

1st Month	2nd Month	3rd Month	4th Month	5th Month and Beyond
1	2	3	4	5

c. Simple redraws (redraws affecting less than 1/4 of the drawing).

1st Month	2nd Month	3rd Month	4th Month	5th Month and Beyond
1	2	3	4	5

d. Complex redraws (redraws affecting more than 1/4 of drawing).

1st Month	2nd Month	3rd Month	4th Month	5th Month and Beyond
1	2	3	4	5

9. Please indicate the period of time you would expect OJT trainees to perform the following changes and redraws. Circle one number under each letter below.

a. Simple changes (changes not requiring title block addition).

1st Month	2nd Month	3rd Month	4th Month	5th Month and Beyond
1	2	3	4	5

b. Complex changes (changes requiring title block addition).

1st Month	2nd Month	3rd Month	4th Month	5th Month and Beyond
1	2	3	4	5

c. Simple redraws (redraws affecting less than 1/4 of the drawing).

1st Month	2nd Month	3rd Month	4th Month	5th Month and Beyond
1	2	3	4	5

d. Complex redraws (redraws affecting more than 1/4 of drawing).

1st Month	2nd Month	3rd Month	4th Month	5th Month and Beyond
1	2	3	4	5

10. Based on the performance you have witnessed, from which group would you most likely prefer to select employees for your squad or section? Plase check only one below.

    a. Special trainees ( ).

    b. OJT trainees ( ).

    c. Neither group ( ).

    d. Either group ( ).

Additional comments. Please write below any additional comments you may wish to make concerning the work performance of the special trainees and OJT trainees.

APPENDIX B

TRAINEE EVALUATION OF TRAINING PROGRAM AND INSTRUCTION

Directions: Your help is requested in evaluating the training program and experiences you received during the first three (3) months of employment as a draftsperson for TVA. Please respond to each statement as accurately as possible. If you do not understand a question, do not answer it. Please do not sign your name to the questionnaire. Your responses will remain confidential. Please check only one answer on the line to the left of the lettered response. Note: The training supervisor refers to the instructor(s) under whom you received training.

1. Did you clearly understand your duties and responsibilities after the first day on the job?

   ____a. Yes (If this is your answer go to item 3)

   ____b. No (If this is your answer go to item 2)

2. How many days after the first day on the job did you clearly understand your duties and responsibilities?

   ____a. 2 days

   ____b. 3 days

   ____c. 4 days

   ____d. 5 days

3. How would you describe the organization of your training period?

   ____a. Very well organized

   ____b. Well organized

   ____c. Poorly organized

   ____d. Very poorly organized

4. How well was the training time used?

   ____a. Very effectively

   ____b. Effectively

   ____c. Unsatisfactory at times

   ____d. Not satisfactory at all

5. How prepared did you feel after the training period (3 months) to assume additional duties and responsibilities?

____a. Very well prepared

____b. Well prepared

____c. Poorly prepared

____d. Very poorly prepared

6. How much agreement was there between your training and your work after training?

____a. Very close agreement

____b. Close agreement

____c. Little agreement

____d. Very little agreement

7. How much of your training time was spent on improving your drafting skills and learning TVA's standards?

____a. All of my time

____b. Almost all of my time

____c. Half of my time

____d. Less than half of my time

8. Were clear explanations given for important points or ideas as they related to TVA Drafting Standards?

____a. Always

____b. Almost always

____c. Sometimes

____d. Rarely

9. Did your training supervisor encourage you to seek his/her help when necessary?

____a. I always felt welcome to seek help

____b. I often felt welcome to seek help

____c. I sometimes felt hesitant to seek help

____d. I often felt hesitant to seek help

10. How interested was the training supervisor in effectively teaching the material covered in the program?

____a. Always

____b. Almost always

____c. Sometimes

____d. Rarely

11. How frequently was the training supervisor available to answer questions, give assignments, and provide new instruction?

____a. Always

____b. Almost always

____c. Sometimes

____d. Rarely

12. Did the training supervisor use teaching methods other than the lecture method?

____a. Always

____b. Almost always

____c. Sometimes

____d. Rarely

13. Did the training supervisor provide written evaluations of your performance?

____a. Always

____b. Almost always

____c. Sometimes

____d. Rarely

14. How would you rate the teaching methods used during your teaching period?

____a. Excellent

____b. Good

____c. Below average

____d. Poor

15. How would you rate the overall instruction offered?

____a. Excellent

____b. Good

____c. Below average

____d. Poor

16. How would you rate the overall training program under which you received training?

____a. Excellent

____b. Good

____c. Below average

____d. Poor

17. Additional comments:

APPENDIX C

RAW DATA FOR CLOSED-ENDED ITEMS ON THE ENGINEER AND SUPERVISOR QUESTIONNAIRE

	Items																												
	1		2					3					4		5		6		7		8				9				10
Respondents	a	b	a	b	c	d	e	a	b	c	d	e	a	b	a	b	a	b	a	b	a	b	c	d	a	b	c	d	
1	3	3	2	2	2	2	2	3	3	3	3	4	2	2	2	3	1	2	2	3	1	2	2	2	1	2	2	3	1
2	3	3	2	3	3	2	1	3	2	3	3	2	2	2	2	3	1	2	2	3	1	2	3	3	2	3	2	2	1
3	3	3	2	2	2	2	2	3	3	2	2	4	2	2	3	2	2	3	2	3	1	1	1	2	1	2	2	3	1
4	3	3	2	3	2	3	2	3	3	3	2	3	2	2	2	3	1	2	2	3	3	4	2	2	3	3	2	3	1
5	3	3	3	2	2	2	1	2	3	3	3	2	2	2	3	3	1	2	2	2	2	1	3	4	1	3	2	3	2
6	3	3	2	3	2	2	2	3	3	3	3	4	2	2	3	3	2	2	2	3	1	2	2	2	2	3	4	3	1
7	2	3	1	1	2	2	2	3	2	3	4	3	2	3	2	3	1	2	3	3	1	1	3	2	3	4	3	4	4
8	3	3	2	3	2	3	3	2	3	4	3	4	2	2	2	3	3	2	2	3	3	4	2	3	2	3	2	2	2
9	4	3	2	2	3	2	2	4	3	3	3	3	2	2	2	4	1	2	2	2	2	2	2	2	2	3	4	3	1
10	3	3	2	3	2	1	2	3	4	3	4	3	2	2	2	3	1	2	2	3	1	1	3	4	2	4	2	4	1
11	2	3	2	3	2	2	3	3	3	3	3	4	2	2	2	3	3	2	2	3	2	2	2	2	1	3	2	3	4
12	3	3	2	3	2	2	2	3	3	3	3	4	2	2	2	3	1	2	2	3	2	2	3	2	1	3	3	3	1

Note: A Likert scale with five response categories, one to five, was used for all items. A score of one was shown for positive responses while five was used for negative responses.

APPENDIX D

WRITTEN COMMENT BY RESPONDENTS ON THE ENGINEER AND SUPERVISOR QUESTIONNAIRE

Respondent 2

I think the groups responded very well, and it helped them to learn the way that TVA wants things done. It also took the burden out of the hands of the squads to teach them drafting standards. I think it should continue.

Respondent 3

One thing that can be said for group trainees is that it depends on the individual trainee whether the work is good, bad, or in-between. OJT trainees would be preferred because different sections require different types of drafting, and some things learned in group training will be hard to untrain when trainees are distributed.

Respondent 6

Special program was worthwhile with interest by those participating.

Respondent 7

I haven't reviewed the work of OJT trainees recently; however, from past experience, I believe it is necessary for those OJT trainees to have some minimum industrial experience similar to the Summer Drafting Training Program before they will become productive.

Respondent 8

The summer group trainees seem to receive a concentrated course in TVA drafting practices as well as learning or improving their general drafting skills. They don't seem to learn as much that has to be unlearned as compared to OJT trainees. The work done by the summer trainees had to be well-defined since the designer was not available to answer questions. This makes evaluation of the summer trainee's ability to do more complicated work difficult. The OJT trainee can be given more difficult assignments earlier because the designer can give personal instructions while the work is being done. However, the OJT trainee often becomes too dependent on the designer and may spend too much time asking questions. The summer trainee is less dependent on the designer and seems to have more initiative. Overall, I believe the summer trainee is better prepared and will advance faster after an initial break-in period of about six months.

Respondent 11

It would be of benefit to TVA as well as the employee if every SE hired by TVA regardless of his previous training or experience were required to go through a drafting training program to familiarize them with TVA standards. The length of time spent should be determined by the progress of the individual and might range anywhere from one week to three months. I would say that anyone who was not doing acceptable drafting in three months is hopeless.

APPENDIX E

RAW DATA BY SPECIAL TRAINEES ON THE TRAINEE QUESTIONNAIRE

	Items													
Respondents	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	b	b	a	b	b	a	a	b	a	c	b	b	b	b
2	b	b	a	a	b	a	a	b	a	c	a	b	a	a
3	b	a	a	b	a	b	a	a	a	c	b	b	b	a
4	b	b	b	b	b	a	b	a	a	a	a	b	b	b
5	b	a	b	a	b	b	a	c	b	b	b	a	a	a
6	b	b	c	b	a	a	b	b	a	a	a	b	b	b
7	b	b	a	a	b	a	a	a	a	a	a	b	b	b
8	b	b	a	b	b	b	a	a	a	b	a	b	b	b

Note: With the exception of item 1, all items required an a, b, c, or d response. Response "a" was positive and response "d" was negative. Items 1 and 2 are not shown because item 1 required a yes or no response. All respondents answered yes and were asked to go to item 3.

APPENDIX F

RAW DATA BY OJT TRAINEES ON THE TRAINEE QUESTIONNAIRE

Respondents	Items 3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	b	b	b	a	c	b	b	c	b	c	b	c	b	b
2	b	b	a	a	c	b	a	b	a	c	b	b	b	c
3	c	b	b	a	b	c	b	a	b	b	c	a	b	b
4	b	c	b	b	c	c	c	b	b	c	c	c	b	b
5	b	b	c	a	b	b	b	c	b	c	c	b	c	c
6	c	c	b	a	c	b	b	b	c	c	b	c	b	b

Note: With the exception of item 1, all items required an a, b, c, or d response. Response "a" was positive and response "d" was negative. Items 1 and 2 are not shown because item 1 required a yes or no response. All respondents answered yes and were asked to go to item 3.

VITA

Ronald Joseph Berthelot was born on September 16, 1939, in Gramercy, Louisiana. He was graduated from Destrehan High School, Destrehan, Louisiana, in 1959. He graduated with a B.S. in Industrial Technology from Southeastern Louisiana University in 1967 and with an M.S. in Industrial Education from the University of Tennessee in 1970. The Ed. D. with a major in Curriculum and Instruction was conferred by the University of Tennessee, Knoxville, in March 1981.

He was in the U.S. Army from 1961 to 1964 where he worked as an electronic technician.

His industrial experiences include working as a quality control technician for a foods plant and service as a radio navigator for the oil exploration industry in the Gulf of Mexico.

He is the Department Head of Industrial Technology at Pensacola (Florida) Junior College, where he was Acting Department Head from 1979-1980 and Assistant Department Head between 1976-1979. He was an Instructor of Engineering Technology at Roane State (Tennessee) Community College from 1974-1976. During 1973-1974, he taught Industrial Arts for Sarasota (Florida) County Schools. He was a teacher educator for the University of Maryland, European Division, from 1971-1973, where he taught prospective Industrial Educators in West Germany and Turkey. From 1967-1969, he taught Industrial Arts for Oak Ridge (Tennessee) Schools.