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THE EDUCATED WORKER: A CASE STUDY OF
EDUCATIONAL NEEDS AND PROGRAM OF
DEVELOPMENTAL READING

by
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A Dissertation Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the Degree of

DOCTOR OF PHILOSOPHY
URBAN SERVICES

OLD DOMINION UNIVERSITY
May 1984

Approved by: 

~~John S. DeRolf (Director)~~

Dedicated

To my husband and my children

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CHAPTER ONE

THE IMPORTANCE OF AN EDUCATED WORKER

The Research Problem

In today's developed societies, there is a need for workers to possess educational skills commensurate with the positions which they hold. It appears that a significant group of workers do not have sufficient educational skills.

Today's business, industrial and governmental organizations need to become aware of the educational requirements for the various positions within their organization and to be aware of the educational level which their employees actually have attained. A problem arises if there is a gap between need and actual performance. Human resource development, HRD, is one method of remediating any discrepancies found between employee educational needs and employee educational skills.

Human resource development is a three-pronged concept of training, education and development.¹ As such, HRD addresses discrepancies between need and actuality for the worker in his present job, for the worker as he prepares for a different job within the existing organization and for the

¹Leonard Nadler, Developing Human Resources (Houston: Gulf Publishing Co., 1970), p. 11.

worker as he moves with the organization as it changes and develops. HRD can be a means, therefore, to create and maintain a flexible and viable workforce which might be desirable for today's job environment.

This research is a two-fold project combining an educational needs analysis and a suggested program of remediation using the concepts of human resource development for a specific situation. The aim of this study is to determine the level of educational skills that a particular employee population is required to have and, subsequently, to determine the level of educational skills which the employees actually possess.

Significance of the Problem

There is a need for workers in a developed industrial society to meet the educational requirements of their tasks. Each worker must be an "educated worker." No worker can be ignored. A worker who lacks the educational skills needed for a particular position is to be considered under-educated. An under-educated worker can have a negative impact on production. Also, the under-educated worker can be a safety hazard both to himself and to those who come in contact with his output. Each worker is important.

It would appear that the impact of the under-educated worker is multifaceted. Worker under-education could affect production, safety and quality of work life up, down and across job interdependences. Therefore, organizations would

benefit from sufficiently educated workers. This kind of workforce would be better able to adapt to any future technological changes.¹ As an organization itself changes over time, a better educated workforce would be more flexible and capable of moving with the organization in heretofore unknown directions.²

Conversely, the under-educated components of an organization would find it difficult to function if increased technological demands were placed on them. The under-educated worker would be more likely to be locked-in to accomplishing one task or one set of tasks and unable to move into totally unforeseen paths with the future organization.³ Thus, it would appear that the maintenance of an educated workforce is an important goal for today's business, industrial and governmental organizations.⁴

The worker in today's business, industrial and governmental organizations is being confronted with the prospect that educational standards for every job in society are being raised.⁵ The work environment is becoming more

¹Ibid., p. 11.

²Ibid., p. 89.

³Douglas H. Fryer, Mortimer R. Feinberg and Sheldon S. Zalkind, Developing People in Industry (New York: Harper & Brothers, 1956), p. 21.

⁴Bernard J. Bienvenu, New Priorities in Training (New York: American Management Association, 1969), p. 13.

⁵Richard Reeves, "Cold Fear in Black America," Detroit Free Press, 27 June 1982, p. B4.

complex. Jobs are increasing in sophistication. Not only are jobs becoming more technical and involved, few jobs, even the most menial, can be completed in isolation. Each task has become surrounded by components which are secondary to the task at hand, but from which the task cannot be divorced.

A feature of the modern production line is that tasks are sequential. Tasks are dependent on preceding work completion and determine subsequent completions. In addition, highly technical tasks are dependent on less technical tasks. Thus, the post-industrial revolution work environment is linked both horizontally and vertically throughout the range of tasks. Each worker, therefore, needs to meet at least the minimum standard of educational skills necessary for his task if he is to serve as a viable link in the chain that binds today's work environment.

Examples of task interdependence abound along the continuum of task complexity in today's work environment. For example, an oiler lubricates a machine by squirting oil in the proper holes. An oiler today, however, is responsible for lubricating various types of machines which require different lubricating solutions. The oiler must be able to read the instructions for maintenance of each machine. In addition, the oiler must sign-off certifying that a certain machine has been correctly oiled on a prescribed time schedule. An under-educated oiler can have a negative impact on production. Any task which depends on that machine, in turn,

depends on that oiler. Also, an under-educated worker could be a safety hazard both to himself and to those who come in contact with his output.

If educational standards for jobs are increasing, then the workforce as a whole must become better educated. Today's worker needs to have basic educational foundations sufficient to function efficiently and safely in the work environment.

Educational needs for tasks will vary widely. Nevertheless, a minimal standard of educational achievement necessary for living in the 1980s in the United States has been suggested by the International Reading Association. Those adults in the United States with less than eighth grade educational achievement level are now considered "functional illiterates" indicating that this is the basic level necessary in order to function at a minimum level in today's complex environment.¹

The Commonwealth of Virginia is typical in representing the magnitude of need for education to bring all workers to this minimum level. In Virginia, 33 percent of the adult population over twenty-five years of age have less than an eighth grade education.² Nationwide, 39 million adults do

¹Angelica W. Cass, Basic Education for Adults (New York: Association Press, 1977), p. 148.

²Interview with William M. Moore, Supervisory, Adult Education Service, Department of Education, Commonwealth of Virginia, 29 September 1980.

not have an eighth grade education.¹

There is the possibility, therefore, that large numbers of workers are under-educated. If completion of high school is assumed to be the basic requirement for job success, then in the Commonwealth of Virginia alone, 53 percent of the adult population would not qualify.² William Beckham maintains, "We're raising the standards of education for every job in the society and we have a class of people, a class getting larger and larger, that has less and less education."³

Timeliness of the Problem

The dichotomy between worker educational needs and worker educational accomplishments represents a timely problem to be addressed by human resource development. It is probable that changes will continue to occur in the American job market. The work environment will continue to evolve. Although it is not possible to ascertain the future economic make-up of the United States, several groups have expressed opinions as to future scenerios. These descriptions are, however, amplifications of existing conditions.

According to the United States Department of Labor, by 1990 one-half of the American workforce will be replaced by

¹Wanda Dauksza Cook, Adult Literacy Education in the United States (Newark, Delaware: International Reading Association, 1977), p. 159.

²Moore, 29 September 1980.

³Reeves, p. B4.

robots.¹ Robots will supplant the worker in those jobs which are considered dull, dangerous or monotonous. Japan today uses robotics in business and industry to a greater extent than does the United States. Japanese executives have projected that by 2000 A.D., automation will be so extensive that Japan will have only "knowledge workers."

Automation does not mean, however, the demise of the human worker. Gordon McAlpine, an expert in the future of automation in the automotive industry, does not see that automation will reduce the number of jobs; rather, it will spur a change in jobs.² Management and unions will, in McAlpine's opinion, need to meet the challenge to help to produce a better educated workforce. This change will require for the American workforce to have a better educational background. It is to an organization's and to society's best interest to help change any worker caught in the coming metamorphosis of the workforce. The unskilled worker cannot be disowned. Human resource development could assist in this transformation.

Research Objectives

Human resource development is used by this research project in a specific situation. Norfolk Naval Shipyard in

¹NBC Magazine, "Robots in the Workplace," 26 February 1982.

²Gordon McAlpine, "Will Computers Replace Workers?," Detroit Free Press, 11 November 1981, p. A1.

Portsmouth, Virginia, is an industrial organization where educational needs for jobs are changing. The first objective of this project, therefore, is to develop an operational model for human resource development in an organizational setting.

The second objective is to design a program for upgrading the educational capabilities of in-service workers.

The third objective is to identify alternatives and recommend an approach for meeting the changing educational needs of the American shipyard industry.

Human resource development is the vehicle by which these objectives are to be carried out in the specific industrial setting.

Review of the Literature

Previously, segments of the American workforce, particularly those positions designated "blue-collar," were considered disposable.¹ If the needs of an organization changed, it was easier to acquire a new group of employees with the desired traits than to update the old ones.²

Human resource development basically was limited to a concept of on-job-training. The objective of on-job-training, OJT, was to provide the means to solve immediate and

¹Interview with James C. Barnes, Assistant Director of Research, The Kendall Company, Charlotte, North Carolina, 20 September 1979.

²M. W. Warren, Training for Results (Reading, MA: Addison-Wesley Publishing Co., 1979) p. 3.

pressing problems. The training was the presentation of the needed skills or techniques, usually by first line supervisors.¹ The goal of OJT was to improve production and, thus, to increase profitability.

Productivity remained an important goal of organized learning activities within a corporation. Organizations have felt that any programs of human resource development must be justified in monetary terms of increased profits. Under this philosophy, each worker was not necessarily considered important. It was also not important that the average worker be an educated worker. The end product was considered most important.² If, however, the rationale for any human resource development was to be stated as a financial consideration, then the idea of the cost of not training had to be considered.³ An organization had to decide if the expense of providing training for its workforce was worth it. Whether or not a given training program is profitable cannot be determined in terms of the cost of the end product unless a comparison can be made of end product costs with and without training.⁴

¹Frank A. DePhillips and William M. Berliner, Management of Training Programs (Homewood, Ill.: Richard D. Irwin, 1960), p. 230.

²Fryer, Developing People in Industry, p. 31.

³David King, Training within the Organization (London: Tavistock Publications, 1968), p. 152.

⁴William McGehee and Paul W. Thayer, Training in Business and Industry (New York: John Wiley & Sons, 1969), p. 9.

The last two decades have witnessed another rationale for the use of human resource development within business, industrial and governmental organizations. Concurrently, a shift in attitude by management towards the workforce appeared. Bienvenu stated that the concept of human resource development must shift from being a vehicle of immediacy to solve a pressing problem to become, rather, a way of life.¹ Human resource development, Bienvenue contended, "Can no longer be geared solely to the goal of preparing workers for immediate productivity."²

Instead of confining human resource development to solving immediate problems, it was suggested that organizations should consider the need for training employees in areas other than those of a technical nature directly related to job success.³ An organization should also consider training situations which would be able to relate to both the present and to the future of the organization.⁴ In this model, employees became more important and were not considered disposable.

A parallel relationship between the concepts of human

¹Bienvenu, New Priorities in Training, p. 19.

²Ibid., p. 13.

³Charles A. Denova, Self and the World of Work: A Review of Basic Literature, The Educational Technology Review Series, No. 12 Training in Business, Industry and Government (Englewood Cliffs, New Jersey: Educational Technology Publication, 1973), p. 65.

⁴DePhillips and Berliner, Management of Training, p. 274.

resource development and management's view of a workforce was illustrated further by Jacob Javit's opinion that worker education can accomplish two goals. First, worker education would be the vehicle for improving and expanding skills in the workforce. Secondly, worker education could also be a means to help individuals cope with the pressures of rapid social and technological changes in today's work environment.¹ It is Javit's opinion that in order to achieve a truly productive and equitable society, all Americans must be assured access to all levels of education throughout life.

Another viewpoint of human resource development grew out of the work of Leonard Nadler. In his milestone book, Developing Human Resources, Nadler attempted to provide structure and definition to the concept of human resource development. Nadler carefully considered the various needs for learning which occur within business, industrial and governmental organizations. Nadler expressed the rationale for learning experiences in these organizations as: 1) a need to allow each individual to grow, 2) a need to maintain a viable and flexible organization with planned development, 3) a need for behavioral changes in individuals because of changes in technology, 4) a need for the organization to meet societal forces and 5) a need for the organization to

¹Jacob J. Javits, "Learning for Workers-Federal Policy Implications," Training and Development Journal 32 (July 1978): 20-26.

handle changes in the workforce.¹

Nadler separated human resource development into three categories: training, education and development.² Each segment had different goals and sometimes employed different techniques to reach the goals.

Training included organized activities to produce behavioral changes in an employee's skills, attitude or knowledge directly related to his present job.

Education, however, equipped employees to move into new positions. This aspect of human resource development endeavored to increase the possibility of internal mobility in order to retain the organization's best people.

Thirdly, development activities involved broader goals, fewer specific behavioral objectives and were not as easily evaluated in terms of return of investment to the organization. Ultimately, development involvement was to produce viable and flexible employees for the organization.

Traditionally, it has been the conviction of business, industry and government that training and education activities were within their purview. However, it was felt that employee development lay beyond the scope of the organization's responsibility to employees and was not a justified expense.

Employee development would more likely be considered

¹Ibid., pp. 46, 61 and 88.

²Nadler, Developing Human Resources, p. 11

a justified expense if an organization viewed its workforce as an investment. This slant toward the use of development in business, industry and government regards employees as valuable assets. This shift corresponds with the changes in the workforce. In a society with abundant and cheap labor and many unskilled or low skill jobs, the average employee becomes an expendable, replaceable item, not a valuable asset. In addition, many organizations formerly have thought of productivity improvement as a matter of new plants, better equipment and improved technology. Human resource needs and subsequent changes had been ignored as a means to add significantly to productivity.¹

Profits have been the bottom line for businesses and industries. Profits have been assumed to be tied to old versus new plant facility, good equipment versus broken down equipment or state of the art technology versus out of date technology. However, as Roscow contends, profits are increasingly influenced by an organization's workforce.²

An organization's workforce represents an operating cost. Typically, the total expense to an organization for human time and presence on the job is equal to approximately 70 percent of the total cost of operation.³ Thus, an

¹Colin C. Hampton, "Human Resources Key to Productivity," National Underwriter 84 (November 1980): 13.

²Jerome M. Roscow, "Manage Him Like an Asset," Inc 3 (February 1981): 72.

³Robert A. Killian, Human Resource Management (New York: American Management Association, 1976), p. 7.

organization's workforce may not be expendable; rather, the workforce could be considered an important asset to be cultivated for maximum return on the investment. For example, a recent study by Dahl of the Upjohn Company indicated that the cost of people was the single largest investment in the company.¹ In a survey of large accounting firms it was found that large sums of money were spent by these organizations on human resources.² This expenditure was viewed as an investment and as such should be found on the organization's balance sheet. If organizations are to survive in a competitive market place, they may no longer be able to ignore their investment in human capital.³

Several options have been suggested of ways to improve on the aforementioned investment. Warren suggested four alternatives: 1) simplify the work so as to eliminate the need for new or additional skills, 2) change the workflow or work process to use skills already available, 3) automate and replace human resources or 4) incorporate on-going programs of training/education/development to create a

¹Harry L. Dahl, "Measuring the Human R.O.I.," Retail Control 4 (February 1981): 55.

²David A. Dittman, Harvey A. Juris and Lawrence Revsine, "Unrecorded Human Assets: A Survey of Accounting Firms' Training Programs," Accounting Review 55 (October 1980): 641.

³Joseph Lowman and Thomas Snediker, "Pinpointing Avoidable Turnover with 'Cohort Analysis,'" Personnel Journal 59 (April 1980): 310.

viable, flexible workforce.¹

Furthermore, the idea that an organization's workforce represents an investment and is an operating cost emphasizes the need for human resource development. HRD would be a means to maintain a viable organization with planned organizational growth and to produce behavioral changes in individuals to accompany changes in technology. It would also be a means for an organization to handle changes in the workforce.

The changing composition of the workforce is one reason for an increasing need for the three prongs of human resource development to be the method to ameliorate discrepancies between need and actuality. Jobs generally are requiring more education for satisfactory performance. Many more Americans have been able to take advantage of some form of formal education beyond high school than in previous generations. Nevertheless, literally millions of Americans never make it to eighth grade. Today a broad general education needs to be emphasized.² Development becomes, then, a necessity rather than a luxury.

It appears, thus, that an organization can benefit in developing a workforce which has the basic skills to move with it into an as yet unknown future. The future need

¹Warren, Training for Results, p. 3.

²Keith E. Thurley, "What is an Ideal Preparation for Industrial Relations Practitioners," Labor Gazette 77 (March 1977): 112.

seems to be for the worker who is, using the U.S. Department of Labor's term, a "total man." Expenditure for developmental HRD programs, therefore, becomes not only justifiable, but also necessary for organizational survival.

Therefore, the perceived role of the American worker has evolved from a disposable resource to become a valuable growth investment. Currently, the worker is viewed both as a valuable asset and as an operating expense. This shift highlights the usefulness of human resource development. Each aspect of human resource development supports another. Educational development is no longer a frill. The expense for educational development should be accepted as an investment with an organization's human capital as much as training or education programs traditionally have been accepted. As noted, educational development in many instances precedes and supports training. Indeed, development is basic for training to succeed. In addition, development can, as usual, follow and supplement training and education.

Research Design

Research Questions

What are the reading needs of specific industrial organization? The question of reading needs has several components. What is the general level of reading proficiency which is needed by all employees at Norfolk Naval Shipyard? Are the reading needs of the various segments of the workforce at the shipyard different? In addition to a

basic reading ability, are there specialized vocabularies and terminology which are needed for employee competency?

Secondly, what level of education has the wage-grade segment of the workforce attained?

Thirdly, if a discrepancy is noted between reading need and employee performance, how are the deficiencies to be overcome? What are the programmatic approaches for dealing with the problem?

Finally, how will the suggested program be implemented?

Research Approach

A case study approach is chosen to address these research questions. This research focuses on one specific situation and explores the need for maintaining a workforce at a specific educational level. The Norfolk Naval Shipyard is chosen to examine human resource development as one answer to the problem of how to survive the present and plan for future evolution.

Norfolk Naval Shipyard is changing in the same manner as the rest of the American workplace. The basic educational level required is rising there as elsewhere. It has been suggested that discrepancies between necessity and actuality are prevalent throughout all of our economic and social order. If our whole society is confronted with this gap of necessity and actuality, then the situation cannot be ignored nor expected to resolve itself. A representative of Worldwatch Institute, Lester R. Brown, suggested that the

situation is serious. He feels that as is, our society is unsustainable. Today's American society is beset by environmental stresses which are pushing the society towards collapse. He asserts that in order to move toward a sustainable society, fundamental economic and social changes would be required. Indeed, "New skills will be needed and old skills will become obsolete....This need for new skills will thoroughly challenge the educational and training facilities of universities, corporations and government agencies."¹ This requirement for new skills is the necessity for training for development and development to support training; the need for the "total worker" capable of changing with an organization and with society. This research suggests one way to create that viable and flexible "total worker."

The Norfolk Naval Shipyard in Portsmouth, Virginia, repairs and refurbishes all ships and shipboard equipment for this nation's fleet. Norfolk Naval Shipyard is older than the United States having begun as a private shipyard during colonial-days known as the "Gosport Marine Yard." The shipyard was bought by the federal government in 1801. The first dry dock in America was built there and completed in 1834. This dry dock is still in use today. Norfolk Naval Shipyard is the largest naval shipyard engaged in

¹Lester R. Brown, "R & D for a Sustainable Society," American Scientist 70 (January-February 1981): 15.

the repair, conversion, overhaul and modernization of ships in the Navy's fleet. It is commanded by a naval officer, an admiral, who is responsible for organizing and managing the civilian and military workforce.¹

The Norfolk Naval Shipyard has a workforce of more than 12,000 civil service employees. Of this 12,000 man workforce, approximately 9,100 are "blue-collar" government service-grade employees.

The shipyard's needs change as the ships it services change. Although the shipyard personnel may remain static over time, their skills cannot.

Job needs at the shipyard have in recent years become more involved. As the ships and the support systems which the shipyard services have increased and become more complex, so have the regulations of how-to, what-to and when-to do everything.

The shipyard generates a large volume of printed material concerning training, work and safety instructions, certifications of work completed and general work information. In addition, printed instructions which originate on a national level, such as fringe benefit instructions, are passed on to the employees. Because no worker performs his task in isolation, it is of utmost importance that the shipyard maintain a workforce which is capable of responding to

¹Norfolk Naval Shipyard Employee Handbook, NNSY P12410-2, Norfolk Naval Shipyard, Portsmouth, Virginia, 1978, pp. 1-5.

such a work environment.

Norfolk Naval Shipyard is concerned that members of its workforce do not have the basic educational foundations necessary to respond to printed instructions such as occur in the course of task completion. Major discrepancies might contribute to inefficient use of man-hours, ineffective training and chance, at times, of less than optimum safety conditions.

Program design

Norfolk Naval Shipyard is used as a case study in order to address the research questions of this project. Several different analytical methods are involved. One research question involves estimating the expected reading level for wage-grade employees. The Fry test of readability is applied to a systematic sample of shipyard documents. Results of this testing can be an indication of the expected reading level necessary at the shipyard to function effectively and safely.

Secondly, interviews are conducted with key managers and supervisors. The focus of the interviews is to elicit information of management expectations concerning educational expertise needed by wage-grade employees.

These two aspects of the case study provide information necessary to establish the reading competency level needed at the shipyard according to management.

Additionally, a systematic sampling of official

personnel folders of the wage-grade segment of the shipyard workforce is to provide information of the actual educational levels which these employees have obtained. The wage-grade employees are separated into categories according to job level assignment. The results of the sampling of folders indicate what percentage of employees in each category have not completed high school or ten or eight grades of formal schooling.

These methods of testing, interviewing and sampling are employed to establish the possibility of a problem at Norfolk Naval Shipyard.

The subsequent portion of this project involves the generating of alternative suggestions for a program of remediation. Five alternatives which require varying levels of commitment from the shipyard are proposed. The alternatives are rated for feasibility of implementation based on estimates of several criteria.

Data collection

Two kinds of data are necessary to perform a needs assessment of reading level for wage-grade employees at the shipyard. First, the actual educational attainment levels of the targeted employees need to be obtained. Secondly, data are necessary to establish the reading level of shipyard documents to which wage-grade employees must respond.

In order to design an amelioratory program, data on availability of information, administrative organization

of the shipyard, concepts of andragogy are necessary.

Data on educational attainment levels of the wage-grade employees are available in the official personnel folders which are maintained on all employees. The last completed grade in school is recorded for each of the sample population. The information is separated into wage-grade categories. Percentage of employees for each of five educational level categories are tabulated. Findings are extrapolated to include the entire wage-grade segment of the workforce at Norfolk Naval Shipyard.

Data for establishing an expected reading level for wage-grade employees is collected from a systematic sampling of shipyard documents and applying readability tests to the documents. An overall expected reading level is thus indicated. Additional data on educational expectations for wage-grade employees is collected from interviews with managers and supervisors.

The alternative suggestions are analyzed on the basis of estimates of several feasibility criteria: costs, number of participating administrators, number of administrative layers needed for decision making, availability of information, amount of participant initiative required and use of andragogy which is the art of teaching adults.

Furthermore, the recommendation is developed into a program proposal for ameliorating the noted discrepancies. Program objectives are presented along with models representing the path to accomplishing the objectives. Both

process and impact evaluation criteria are included in an evaluation component. The implementation team membership and responsibilities are described. A model of the implementation team's linkages and responsibilities is developed. A budget for the program is presented. A work plan for program implementation and a time model for task accomplishment are also developed. Final recommendations based on the evaluation of the program are made for consideration by the head of the shipyard.

CHAPTER TWO

ESTIMATING EDUCATIONAL NEEDS OF THE WAGE-GRADE SEGMENT OF THE WORKFORCE AT NORFOLK NAVAL SHIPYARD

In our increasingly complex society, each individual should aspire to an ever-rising level of general educational background. This rising educational foundation is required in order for the individual to function effectively both in society at large and in a particular work organization.

Today the worker in business, industrial and governmental organizations must be able to respond accurately to printed instructions. In addition, the worker must be able to communicate his accomplishments through printed media. Not only is it personally beneficial to each employee to have attained the educational foundations necessary for societal needs, it is also beneficial to business, industrial and governmental organizations to have a workforce capable of functioning at whatever educational level is needed. It is, therefore, important for the management personnel of the organization to be aware of the educational level needed by its employees.

In order to maintain a well-qualified workforce, it

must be determined how qualified is sufficient. Two different approaches were used in this research in order to ascertain an estimation of educational need for the wage-grade segment of the workforce at Norfolk Naval Shipyard. One approach was objective; one was subjective.

The objective method of estimating educational need consisted of choosing representative documents, directives and process instructions generated by the various divisions within the shipyard and applying a readability test to them. The results of this procedure gave an indication of basic reading level necessary for the wage-grade employee to be able to function efficiently and safely. Wage-grade employees are expected to be able to read on a college level according to the results of the readability survey. The specifics of this survey are discussed later in this chapter.

The subjective approach consisted of interviews with those administrative and training personnel who had close contact with the workforce and supposedly knew the various job needs for their workers. These managers and supervisors unanimously estimated that their wage-grade employees needed at least a high school education.

Norfolk Naval Shipyard in Portsmouth, Virginia, is a major repair and rework facility for the Department of the Navy. This oldest of American shipyards services a wide array of ships including the most modern with the most sophisticated equipment. Shipyard personnel must continually

adjust to changed procedures on old ships and to brand new ships with unfamiliar equipment. The complexity of the work environment at Norfolk Naval Shipyard is representative of the changes facing business, industrial and governmental organization. The mission statement of Norfolk Naval Shipyard emphasizes the importance of

"Immediate and long-range objectives for enhancing the skills and knowledge essential in maintaining a well-qualified workforce and provide an atmosphere that encourages employees to develop their full potential through self-development and planned work experience."¹

Estimating Educational Need of Wage-Grade Employees from Readability Survey

Jobs at Norfolk Naval Shipyard cover such a wide range of difficulty that it is not reasonable to assume that one educational attainment level will be needed for all employees. An engineering degree is not necessary to drive the shuttle bus. Nevertheless, all wage-grade employees are subject to certain common directives and instructions.

Directives at Norfolk Naval Shipyard require two kinds of responses for employees. An employee must be able to read a printed instruction in order to perform a procedure. Secondly, an employee must be able to read a printed instruction in order to write out a certification that certain procedures have been performed. These common experiences require the employee to read and to write. It is

¹NAVSHIPYDNORINST, P12140.2B, Norfolk Naval Shipyard, Portsmouth, Virginia, 23 March 1979.

from these directives and process instructions distributed to the wage-grade segment of the workforce that an estimated level of reading ability needed can be determined.

Selection of Documents

In order to determine an estimated reading level needed by the wage-grade segment of the workforce at Norfolk Naval Shipyard, representative documents, directives and process instructions were chosen. As are all naval shipyards, Norfolk Naval Shipyard is organized by codes. A code is an organizational division with the shipyard. These divisions are consistent across the country at all naval shipyards. For example, code 800 is Administration, code 180 is Employee Development and code 400 is production. The Production code includes the majority of the wage-grade employees.

Any code at the shipyard can and does generate process instructions and directives for distribution to the workforce. Some distribution lists are very limited; other distributions reach nearly every employee.

NAVSHIPYDNORNOTE 5215 is a current numerical index of directives and process instructions. Each directive is assigned a number. The index includes the directive number, the date issued, the subject of the directive and which code issued the directive.

Originally, in this project 34 directives or process instructions were chosen to represent instructions from the

various codes. The codes were represented as follows: code 100 - ten documents, code 200 - five documents, code 300 - two documents, code 400 - three documents, code 500 - one document, code 600 - three documents, code 700 - two documents and code 800 - five documents.

Out of these first-selected 34 directives and process instructions, 16 were finally chosen for testing of reading level of difficulty. One of the criteria for selection was the inclusiveness of the distribution. Those documents directed toward management were not included in the final group. Because this research focused on the wage-grade segment of the workforce, those management-directed documents were not appropriate. Documents which were distributed to wage-grade employees were used.

The final group of documents selected for readability test included documents representing all the codes except code 500 which is the finance code. Six documents were generated by code 100, two by code 200, two by code 300, one by code 400, one by code 600, two by code 700 and two by code 800. The sample of documents, thus, represented written material from throughout the shipyard aimed for readership by the wage-grade employee. Any conclusions of educational need which arise from the test of document readability are hence general and represent all the sectors of the shipyard.

An additional six documents were included in the final group to represent those pieces of information which

are generated outside of the shipyard. Documents such as Standards of Conduct, NTTE Health Benefit Plan, and When Injured at Work-Facts about Compensation are to be read by all employees. Norfolk Naval Shipyard, however, has no control over the development of these documents as the shipyard does with the writing of the directives and process instructions.

Readability Formula Used

Reading levels of the representative documents were estimated using Edward Fry's readability formula. Reading level is a complex phenomena not easily pinned down. Reading level is reported as an estimation. Much depends on nuances in English vocabulary and sentence structure as well as the use of a specialized vocabulary for a particular audience. For example, the process instruction for shop cleaning of hydraulic system components includes numerous chemical terms which are many, many syllables long, such as trichlorotriflurethane. Although this vocabulary may be exotic to the average reader, the specific employee working with hydraulic systems would find this a term in common use.

Nevertheless, reading level is, at this time, most often determined by measuring the complexity of vocabulary and the length of sentences in the printed material. Passages which are easier to read are comprised of shorter sentences and easier words. Conversely, passages which

contain polysyllabic words and compound, complex construction are harder to read. A word is considered to be easy or difficult on the basis of number of syllables.

Fry's readability formula is based on the number of syllables and number of sentences per 100-word passage.¹ Edward Fry is an expert in the field of reading associated with the Reading Center at Rutgers University. To compute Fry's formula, three passages are selected to be representative of the entire document. Usually one passage at the beginning of the document, one in the middle, and one toward the end of the document are chosen. These passages must be 100 words long. The number of sentences within the 100-word passage and the number of syllables are counted. Sentence length and syllables are then averaged. The resultant averages are then plotted on Fry's graph to determine the estimated reading level of the material.

Fry's method of determining estimated reading level is a relatively easy procedure. In addition, the use of three passages which come from different parts of the material corrects for unevenness in presentation. There is also, though, a disadvantage associated with Fry's approach. Fry developed his formula to be used with book-length selections of a narrative style. Sentence fragments or lists produce spuriously low reading levels. Conversely, run on

¹Albert J. Harris and Edward R. Sipay, How to Increase Reading Ability (New York: David McKay Co., 1975), p. 523.

sentences even with rather easy vocabulary would indicate, according to Fry's graph, a spuriously high reading level.

Another disadvantage inherent in all readability attempts is that reading level is an assumption. While the impact between an eleventh grade reading level and a twelfth grade reading level may be negligible, there are significant differences between material written on a college reading level and that on a ninth grade reading level.

Several of the original group of 34 directives and process instructions at Norfolk Naval Shipyard could not be used because of the aforementioned disadvantage of the necessity of intact 100-word passages. Sixteen internal documents were finally chosen to represent process instructions and directives generated by the various codes. An additional six externally generated documents were included. Table 2-1 presents a list of the documents and the estimated reading level of difficulty.

Results of Readability Application

Overwhelmingly, directives, process instructions and documents analyzed from the Norfolk Naval Shipyard were written on a college reading level. This finding occurred across codes. Not only were instructions for "Procedures for Care of Ill or Injured Employees Under the Industrial Health Program" written on a college reading level, the instructions for unloading and accepting milk deliveries was also on a college reading level. Instructions as to

TABLE 2-1
DOCUMENTS AND READING LEVEL OF DIFFICULTY

Issuing Code	Number	Topic	Date	Estimated Reading Level
100	3140.3	Shipyard Closure Under Emergency Conditions	27 Feb 79	College
106	10470.6	Respiratory Protection	5 Feb 80	College
108	P12713.10B	EEO Policy and Organization	23 May 79	College
130(136)	4855.12B	Program for Detection and Prevention of Deliberate Malpractice; Requirements for	31 Aug 79	College
130(136)	P6260.19B	Asbestos Control Manual	11 Jan 80	College
150	12792.1	Employee Assistance Program	6 Feb 79	College
200	4701.3A	Shop Reports	28 Jul 80	College
242	0556-401B	Hydraulic System Components; Shop Cleaning of	11 Jul 80	College

TABLE 2-1 continuing

300(303)	5100.33	Tagout; Policy and Procedures for Shipyard Facilities	14 Jun 78	College
383.3	0985-401	Fire Watch for Hot Work, Surface Ships and Ashore	19 Feb 76	College
400(404/403)	4010.3A	Solid and Liquid Waste Disposal	12 Nov 77	College
600(610)	7410.10H	Daily Timekeeping Procedures for Payrolls and Cost Purposes	29 Mar 78	College
700	6320.3A	Procedures for Care of Ill or Injured Employees Under the Industrial Health Program	28 Feb 80	College
700	6240.20	Dairy Products Sanitation; Program of	17 Sept 79	College
800(830)	5500.10	Shipyard Security	23 Nov 80	10th Grade
800(830)	5820.4B	Disposition of Property Seized and Withheld from Individuals and Lost or Found Items; Instructions for	25 Jul 79	College

TABLE 2-1 continuing

Standards of Conduct-Guidelines of Our Responsibilities as Government Employees	College
NTTE Health Benefit Plan	College
Federal Facts 1 - Incentive Awards Program	College
When Injured at Work - Facts About Compensation for Civilian Employees of Federal Government	College
Federal Facts 8 - Meeting Your Financial Obligation	9th Grade
A Description and Certification Enrollment in the FEGLI Program	College

Not written
by NNSY
Personnel

procedures if the shipyard must be closed because of an emergency, a document dispursed to all shipyard personnel, was also written at a college reading level.

Several of the documents addressed topics of safety procedures. One dealt with respiratory protection. Another process instruction delineated procedure for disposal of solid and liquid wastes. Both had reading levels of college ability. In addition, the asbestos control manual which was to establish procedures in order to eliminate a possible safety threat was written on a college reading level.

The process instruction, "Fire Watch for Hot Work," detailed a procedure which was to be followed for fire safety when performing hot work. The employee who stands watch, called the Firewatch, must verify to the hot work operator, the employee doing the welding, flame cutting or brazing, that the Firewatch employee has "...Read, understands, and will comply with the requirements of enclosure (.1.2.2.4)." ¹ This section of the process instruction was in all capital letters indicating its importance. The enclosure, however, which must be read and understood by the employee assigned to firewatch was written on a college reading level.

All of the shipyard generated documents except one

¹Firewatch for Hot Work Surface Ships and Ashore, 0985-401, Norfolk Naval Shipyard, Portsmouth, Virginia, 19 February 1976.

document on shipyard security were written on a college reading level.

The documents in the group which were generated outside of Norfolk Naval Shipyard were also overwhelmingly written on a college reading level. Only one, one of the series, Federal Facts, was written on a ninth grade reading level.

Another type of document which shipyard personnel come in contact with is the merit application form. The federal government ascribes to a program of merit application for positions. This procedure involves the publication of a job description including the necessary requirements for qualifications. The estimated reading level of these bulletins is off Edward Fry's graph for complexity of sentences and syllabication.

The wage-grade segment of the workforce at Norfolk Naval Shipyard cannot be divorced from needs of reading and writing. Determining reading level is fundamental to determining educational needs. Because of this basic involvement in the interaction between the wage-grade segment of the workforce and job needs, the reading level of shipyard documents is significant. The writers of the directives and process instructions expected the wage-grade workforce to have reading skills on a college level.

Estimating Educational Needs of the Wage-Grade
Segment of the Workforce
from Interviews

Interviews with Administrators

An additional approach was employed in the attempt to ascertain a minimum educational level needed by the blue-collar employee at Norfolk Naval Shipyard. Interviews were conducted with the group administrative officers of the production code and with the administrative officer of public works. These particular administrators were chosen because it was believed that they would have the best knowledge of educational level needed by the blue-collar workforce. This project focused on the wage-grade segment of the shipyard workforce. The wage-grade segment included approximately 9,100 employees out of a total employment of approximately 12,000. The majority of this wage-grade segment is found in the production code which is code 300. Code 300 is further divided into four sections. Each of these sections has a group administrative officer. These group administrative officers, referred to as Admin Officers, of code 300 occupy important administrative positions, but are not so high up the chain of command that they are removed from the waterfront worker. Indeed, although admin officer is a government service rated position, most of the present admin officers arose from the wage-grade ranks. Two of the admin officers are former journeymen.

These administrative officers were asked what kind of educational foundation their employees needed in order to be a part of a productive, efficient workforce. No one interviewed had any data, nor even an estimation of a specific level of educational achievement needed for success in the jobs under their supervision. One admin officer noted that she knew of instances where employees would have someone else fill a merit application form for them because they could not read and answer the questions themselves.¹ Completion of high school was indicated by all the group administrative officers as the minimum requirement for wage-grade employees.

Interviews with Supervisory Training Instructors

A second group of interviews were conducted with supervisory training instructors, called STIs, for code 300. At Norfolk Naval Shipyard, training is most often conducted by the training instructors or the supervisory training instructor for each specific shop. Each section of code 300 is further divided into shops. Each shop encompasses a specific group of job positions. The electricians constitute one shop, the pipefitters another and the shipwrights a third shop. Each shop has its own group of training instructors. The head of this group is the STI. There is one STI for each shop. For example, Shop 56 is

¹Interview with Marge Thomas, Group Administrative Officer, Code 970, Norfolk Naval Shipyard, Portsmouth Virginia, 25 February 1981.

the pipefitters' shop. The 800 some employees of Shop 56 receive training in special classes in their main building conducted by Shop 56 instructors.

These supervisory training instructors are in constant contact with the production workforce. In addition, the STIs appear to have the best sense of what educational level is needed. Formal educational needs were most evident in the training programs for employees. None of the supervisory training instructors could, however, give any data on educational level needed. The only information which they could convey concerning educational needs were in the form of illustrative anecdotes.

These anecdotes assumed an important role in the determination of educational needs for the wage-grade segment of the workforce at Norfolk Naval Shipyard. Several types of stories were mentioned across the interviews with the STIs. One category of anecdote was the competent worker who would turn in a blank test sheet after a training session. Sleeping through training sessions was another tale. One anecdote with several variations told by three different supervisory training instructors was of the worker, usually older, with a written order or set of instructions who takes the written material to another worker, particularly a younger worker or an apprentice, and says, "I got something in my eye. How about you reading this for me." Another version went, "O.K. hot shot apprentice, now you show me you understand these instructions." One worker

told his STI after turning in a blank test paper that he, "Would not write, not even in front of his wife." The employee did not say that he could not write, rather that he would not.¹

The opinion was expressed by supervisory training instructors that the training which needed to be done in the production code was sometimes impossible to accomplish because the level of education needed, particularly in such basics as reading and arithmetic, was at least on the high school level. Completion of high school was felt to be the minimum level of educational attainment necessary for the wage-grade employee. However, none of the STI could substantiate these opinions with concrete information.

Conclusions from the Interviews

A total of 17 interviews were conducted. Five of the interviews were with group administrative officers. Twelve of the interviews were with supervisory training instructors. Appendix A presents the procedure followed for the interviews and a summary of each interview.

It was the opinion of each of the administrative officers and the supervisory training instructors that the blue-collar segment of the workforce at Norfolk Naval Shipyard need a high school level of education in order to

¹Interview with Steven Falls, Group Administrative Officer, Code 930, Norfolk Naval Shipyard, Portsmouth, Virginia, 19 February 1981.

function effectively on the job and to benefit from training sessions. This opinion was based on observations and not on concrete data.

Conclusions

The strongest indicator of the level of education needed by the wage-grade segment of the workforce was the level at which directives and process instructions were written. As noted earlier, the analysis of the survey of representative directives, process instructions and documents indicated that these materials are written almost without exception on a college reading level. The inference was that the educational level needed for wage-grade employees at Norfolk Naval Shipyard included the ability to read on a college level. The writers of the directives and process instructions expected a wage-grade workforce which read on a college level.

The secondary indicator of the level of education needed by the wage-grade segment of the workforce came from the interviews with the administrative and training personnel. These conclusions of educational needs were opinions and as such were not supported by specific facts. Nevertheless, the administrative and the training personnel un-animously agreed that the minimum educational requirement for the positions under them was a high school education. This need was a minimum educational need for all wage-grade employees and not just for the upper group of wage-grade

positions.

After determining a supposed educational level of need for the wage-grade segment of the workforce at Norfolk Naval Shipyard, the next portion of this research project was to determine the educational level which the wage-grade workforce actually had attained. Chapter Three contains the report of the survey of the wage-grade workforce to ascertain actual educational attainment levels.

CHAPTER THREE

ESTIMATING EDUCATIONAL ATTAINMENT OF THE WAGE-GRADE WORKFORCE AT NORFOLK NAVAL SHIPYARD

Definition of the Problem

Norfolk Naval Shipyard, a major repair and rework facility for the Navy in Portsmouth, Virginia, faces many of the stresses common to business, industrial and governmental organizations today. These organizations need workforces capable of moving with them through the 1980's and further into an as yet uncharted future. To do so requires a viable, flexible workforce. The personnel may not change significantly over the years, but the demands made on the personnel will change.

One of the criteria for developing the desired viable, flexible workforce is for employees to have the educational skills necessary to accomplish the present tasks and to be able to benefit from preparation for future tasks. In order to ascertain whether the wage-grade segment of the workforce at Norfolk Naval Shipyard does have the needed educational skills, it is first necessary to determine what educational level is needed by the wage-grade segment of the workforce. Chapter Two addressed this problem.

Through the use of several different approaches, the educational level of need for the blue-collar employees was judged to be at least on a high school level if not the ability to read on a college level. The readability tests applied to a representative group of written directives, process instructions and documents estimated that the reading level of printed material dispersed to wage-grade employees at Norfolk Naval Shipyard was overwhelmingly written on a college reading level. The interviews with the administrators and the supervisory training instructors who dealt with the blue-collar workforce at the shipyard also indicated an educational level of basic skills needed to be on a high school level at least.

The next step was to estimate the actual educational level of the wage-grade segment of the workforce at the shipyard.

Survey of Educational Attainment
of Wage-Grade Personnel at
Norfolk Naval Shipyard

Population to be Surveyed

At Norfolk Naval Shipyard, jobs are classified as either governmental service, designated GS, or as wage-grade, designated WG. The GS-rated jobs are commonly considered as "white-collar" positions, whereas the WG-rated assignments are considered as "blue-collar." This project is focusing on the wage-grade or blue-collar segment of the workforce.

Norfolk Naval Shipyard employs approximately 12,000 personnel. Of these 12,000, recent employee statistics listed 9,110 as wage-grade employees. The wage-grade segment of the total workforce encompasses a broad spectrum of task requirements from sweepers to electronics supervisors.

Blue-collar jobs are designated as WG-02, the lowest level, to WG-15, specially skilled craftsmen with seniority. There are steps within each wage-grade rating.

Wage-grade 10 is an important dividing rating. WG-10 is the journeyman level representing a skilled craftsman. The WG-10 knows his craft and does not need to be told how to perform a task. Upon finishing four years of training, apprentices enter the ranks as WG-10s.

Those tasks rated from WG-02 to WG-09 are designed to require less skill and knowledge of techniques than are required of the journeyman. The numerical wage-grade ratings above WG-10 designate especially skilled craftsmen who often have seniority status. These positions, WG-11 through WG-15, however, are without supervisory responsibilities.

The supervisors, planners and leaders are also blue-collar positions in this governmental organization. Their special designations are WN, WS, WD, or WL. There are several levels within each of these classifications. These positions require varying degrees of supervisory and administrative responsibility.

It has been estimated that these 9,110 personnel in the

wage-grade rated positions at the shipyard need an educational level of the skills found in high school graduates. In addition, these personnel often need to be able to read on a college level of proficiency.

It has been surmised that a large number of this segment of the shipyard workforce are under-educated. The implications are serious. If the workforce at the shipyard does indeed include large numbers of workers who are under-educated for task needs, then the shipyard is denied that flexibility and viability needed from its workforce today. Therefore, it is important to find a means of determining whether or not the wage-grade workforce is under-educated.

Available Educational Attainment Information

At the time of this project, no statistics existed in Norfolk Naval Shipyard records concerning the educational attainment levels of the wage-grade segment of the workforce. Opinions, however, were rampant among administrators and supervisors. These personnel believed that a significant proportion of the blue-collar workforce had reading and arithmetic skills of such rudimentary level that there was a negative effect on training and, hence, job requirements were not being met. Opinions were based upon numerous incidents across shops of employees who perform satisfactorily on the job as long as they were not required to do any reading or writing. When confronted with written tests during training sessions, these employees would turn in

blank test sheets or would sleep during the test time.¹ There was also the anecdotes of the employee who confronted with a written order or a set of specifications takes the written material to another employee, particularly a younger employee, and says, "I got something in my eye. How 'bout you reading this for me."² A similar scenerio involved an older employee taking printed instructions to an apprentice and saying, "O.K. Now you show me that you can understand these instructions."³ An administrative officer told of instances of employees having others fill out application forms for them because they could not read the questions nor write the answers.⁴

However, no matter how strongly these opinions were held, they were unsubstantiated by relevant data. No data was available to support the administrators' "feeling" of employees' insufficient educational skills. A problem was suspected, but the depth or breadth of the problem was unclear. One strong indicator that low educational skills was

¹Interview with Steven T. Falls, Group Administrative Officer, Group 930, Norfolk Naval Shipyard, Portsmouth, Virginia, 19 February 1981.

²Interview with Charles D. Mooney, Group Administrative Officer, Group 920, Norfolk Naval Shipyard, Portsmouth, Virginia, 17 February 1981.

³Interview with James Byrne, Supervisory Training Instructor, Shop 56, Norfolk Naval Shipyard, Portsmouth, Virginia, 17 February 1981.

⁴Interview with Marge Thomas, Group Administrative Officer, Group 970, Norfolk Naval Shipyard, Portsmouth, Virginia, 25 February 1981.

more than an isolated incidence was the precision measurement test given by the Navy to employees in one of the shops. The failure rate was expected to be 50 percent. In actuality, the failure rate reached 97 percent. One of the challenges to this research, therefore, was to validate or to refute this opinion as expressed by shipyard managers and training instructors.

Survey

It was possible to bring forward relevant data concerning the educational level of the blue-collar segment of the workforce at Norfolk Naval Shipyard from the existing database. An educational attainment level question is asked on the SF-171, the standard government application form. The form is kept in each employee's official personnel folder. These folders are commonly referred to as OPFs. Every applicant for a government job is asked to indicate the highest grade completed in their educational career. Grades one through 12, passing the G.E.D., one, two or three years after high school, completion of a bachelor's degree and graduate work are the possible choices. The applicant circles the appropriate division.

A systematic sample of these official personnel folders of the blue-collar segment of the workforce, therefore, provided a measure of employee educational attainment level. The population to be sampled would include the entire blue-collar segment of the workforce at the shipyard

except those employees in the apprenticeship program. Apprentices were excluded for specific reasons. The apprentices are classified artificially based on the stage of completion of the four-year apprenticeship program. Apprentices are designated as WTs not WGs. A first semester apprentice is classified a WT-02. This classification does not correspond to a WG-02. All entering apprentices have completed high school. Indeed, some entering apprentices have college experience. There are a few apprentices who are college graduates who are now changing fields of work. The educational attainment level of the typical entering apprentice is significantly different from the educational attainment level of the typical WG-02. If apprentices were included in the survey, their special educational background would skew the average educational level of the lower job classifications to a higher level than appropriate. Therefore, no apprentices were included in the survey.

The population to be surveyed at Norfolk Naval Shipyard included approximately 7,900 blue-collar employees according to the head of the record's office. Recent employment statistics generated by the record's office listed 9,110 wage-grade employees of which approximately 1,200 employees were involved in the apprenticeship program. Each of the 7,900 employees had filled out a SR-171. This application form was kept in the employee's official personnel folder.

Wage-grade files were kept by the record's office separate from GS files. No further divisions are made,

however. The OPFs for the entire blue-collar segment of the workforce were filed alphabetically, all 9,110 together from A to Z. There were no listings which separated the blue-collar workers by name into the various grade classifications. It was impossible to know, for example, who all the WG-05s were. A systematic sample, rather than a random sample was collected from the entire wage-grade segment of the workforce at the shipyard.

This project divided the wage-grade ratings into four categories. These categories attempted to represent the major groupings of job types as represented by the WG ratings. The divisions were: WG-02 through WG-09; WG-10; WG-11 through WG-15; and all WNs, WSs, WDs, and WLs.

Category 1, WG-02 through WG-09, was representative of those jobs needing least skill development. This category included all jobs requiring a lower skill level than that of the journeyman. These positions in the shipyard, particularly the lowest ratings, were for manual, unskilled labor.

Category 2, WG-10, included only one wage-grade rating because WG-10 represented the journeyman level. The journeyman was the skilled employee without supervisory responsibilities. A saying among wage-grade employees was that the WG-10s were the backbone of the shipyard. Wage-grade 10 was classified separately also because of the large number of employees at this grade. There were more WG-10s than any other single grade classification.

The third category, WG-11 through WG-15, was represen-

tative of specially skilled journeymen. These were highly skilled employees, but without supervisory responsibilities.

The fourth category was the special designation for upper eschelon of the wage-grade segment of the shipyard workforce, WS, WN, WD, WL. Although these ratings were wage-grade, and therefore, associated as blue-collar positions as opposed to white-collar positions, these supervisors, planners and leaders shoulder greater responsibility than are required of many GS-rated positions in the shipyard.

The educational attainment levels were also divided into categories. Six divisions were established. The twelve years of public school education were separated into four attainment categories. Grades 1-5 were grouped for category one. Category two included attainment levels in middle school, Grades 6-8. Any employee who had not completed eight grades of formal education would be considered as a functional illiterate. The third category included the completion of Grades 9-12. Attainment of a high school diploma was combined with the G.E.D. certificate into category four. Those employees who had attained some post-high school education were listed in category five. Employees who had completed college were marked in category six.

Survey Procedure

All official personnel folders, OPFs, are kept in the record's office at Norfolk Naval Shipyard. The folders for the wage-grade employees are filed alphabetically for the entire wage-grade segment of the shipyard's workforce.

Each folder contains the employee's SF-171, the standard governmental application form. This form includes an educational attainment question. Each employee is asked to indicate the highest level of formal education attained.

For this survey, a systematic sample of the wage-grade employees' OPFs was chosen. Every 15th folder for the entire blue-collar segment of the workforce except for apprentices, as noted earlier, was pulled and the educational level recorded into the appropriate wage-grade category. If the 15th folder was an apprentice, the next folder was counted as the 15th. When official personnel folders are pulled by the record's office, an indicator sheet is left in the files. If the 15th folder was an indicator sheet, the next folder was chosen. In a few instances, a group of folders, three or more, were out. When the 15th folder would have been the first one of this already-pulled group, the 14th folder was chosen. A total of 508 folders were pulled and constituted the sample.

Survey Findings

The systematic sample of the wage-grade official personnel folders included the records of 508 employees. The sample represented the whole population. The grades represented in the sample paralleled the total wage-grade population distribution. There are more employees classified at WG-10 than at any other position in the shipyard. In the sample, the greatest number of folders in one cate-

gory was in the category of WG-10. There are fewer positions above WG-10 as the sample also indicated.

Of those 508 folders in the sample, 146 represented employees in wage-grade category one, WG-02 through WG-09. In the sample, 211 folders were representative of category two, WG-10. Wage-grade category three which included WG-11 through WG-15 was represented by 57 folders in the sample. The final category which included the supervisory and administrative aspect of the wage-grade ratings, the WSs, WN, WDs and WLs, was represented by 94 folders in the sample. Together the sample consisted of 508 representatives of the total 7,900 wage-grade population.

The raw data of educational attainment levels as indicated by this survey are represented in Table 3-1.

TABLE 3-1
EDUCATIONAL ATTAINMENT OF SAMPLE
BY GRADE COMPLETED

Category	1-5	6-8	9-12	HS/GED	SOME AA	BA/BS	Total
WG-02 to WG-09	2	16	40	72	15	1	146
WG-10	5	15	50	117	22	2	211
WG-11 to WG-15	0	6	7	36	6	2	57
WN, WL, WS, WD	0	3	22	59	9	1	94
Grade Totals	7	40	119	284	52	6	508

Based on the judgment of shipyard administrators, supervisors and training instructors, a minimum educational

attainment needed for successful interaction with the work environment was assumed to be high school graduation. These officials assumed that the wage-grade employees at Norfolk Naval Shipyard needed to have finished high school at least.

Figure 3-1 represents the percentages of the wage-grade employees by categories who did not finish high school. The systematic sample of wage-grade official personnel folders provided the information.

In category 1, WG-02 through WG-09, 40 percent of the sample did not finish high school. Of this 40 percent who had not finished high school, one percent had a fifth grade or less education and 11 percent had completed only through middle school. Twenty-seven percent of the sample had completed between nine and 12 years of formal education, but had not graduated from high school.

In category 2, WG-10, 33 percent of the sample had not completed high school. Within this 33 percent, two percent had a fifth grade education or less and seven percent had completed six to eight years of education. Twenty-four percent had completed some high school.

In category 3, WG-11 through WG-15, only 23 percent of the sample had not completed high school. Eleven percent had finished through middle school and 12 percent had dropped out during high school.

In category 4, WS, WD, WN, and WL, 26 percent of the sample had not completed high school. Twenty-three percent of this group had completed between nine and twelve years

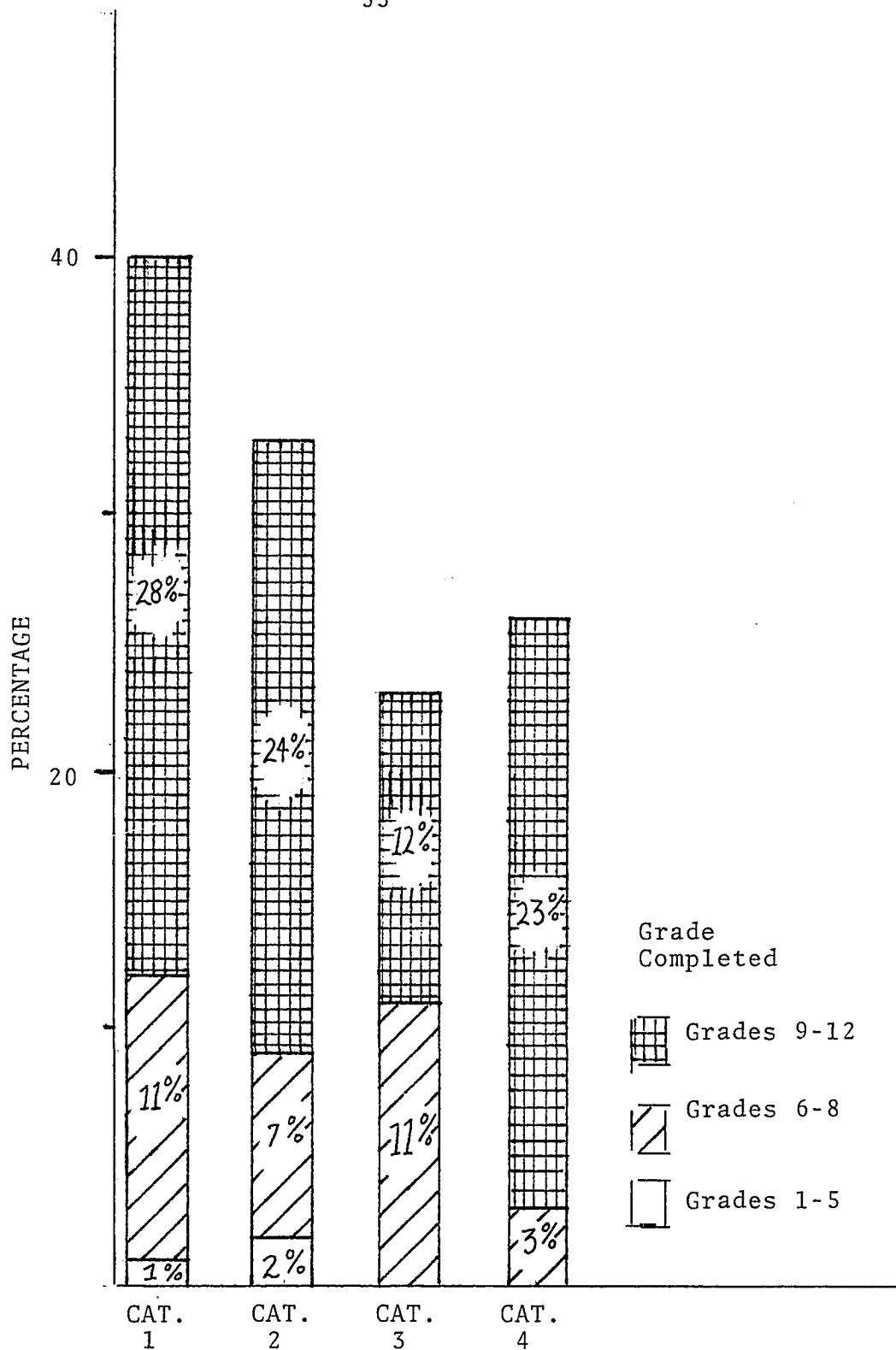


Fig. 3-1. Percentage distribution by categories of wage-grade employees with less than high school diploma

of formal education, but had not graduated. Three percent had only a middle school education.

Within each of these percentages which represent those employees who are under-educated is a group which is targeted as the most seriously impaired educationally according to management assumptions for work environment needs. Those employees who completed eight years or less of formal education are represented as farthest beneath the assumed minimum educational attainment needed. In category 1, 12 percent of the sample had less than an eighth grade education. In category 2, 9 percent of the sample had less than an eighth grade education. In category 3, 11 percent of the sample was four years or more below the minimum educational level needed. In category 4, the percentage at this level is 3. These employees can be considered as functional illiterates.

Another judgment, however, can be made of the assumed minimum educational attainment needed at Norfolk Naval Shipyard. This assumption of educational need comes from the readability tests of printed material as described in Chapter Two. Overwhelmingly directives, process instructions and documents at the shipyard are written on a college reading level. Therefore, it would then be expected that the employees to whom these directives are distributed to be able to read them; that is, to be able to read on a college level. A one-to-one correlation between reading level and grade-in-school level does not exist. Indeed, the higher the grade, the wider the spread of reading ability. Never-

theless, it can be assumed that directives written on a college reading level may be difficult even for those employees who have a high school diploma. If, based on the readability survey, the assumed minimum educational attainment needed for successful interaction with the work environment is more than a high school diploma, then an even larger group of wage-grade employees are under-educated.

This assessment of wage-grade employee under-education is graphically represented in Figure 3-2.

In category 1, 60 percent of the sample had a high school diploma or more. However, only 11 percent had more than a high school education. If more than high school educational skills are required, then 89 percent of category a employees are under-educated.

Category 2 also has only 11 percent of the sample with more than high school attainment. Therefore, 89 percent of these employees would be considered under-educated.

In category 3, 15 percent of the sample has attained more than high school education. However, 85 percent might not have the educational skills necessary to perform satisfactorily in their work environment.

In category 4, once again 80 percent of the sample is under-educated if the assumed minimum educational attainment needed is based on the readability survey.

Figure 3-3 is a cumulative representation of educational attainment by category. This running count graphically represents which category will contain the greatest pool

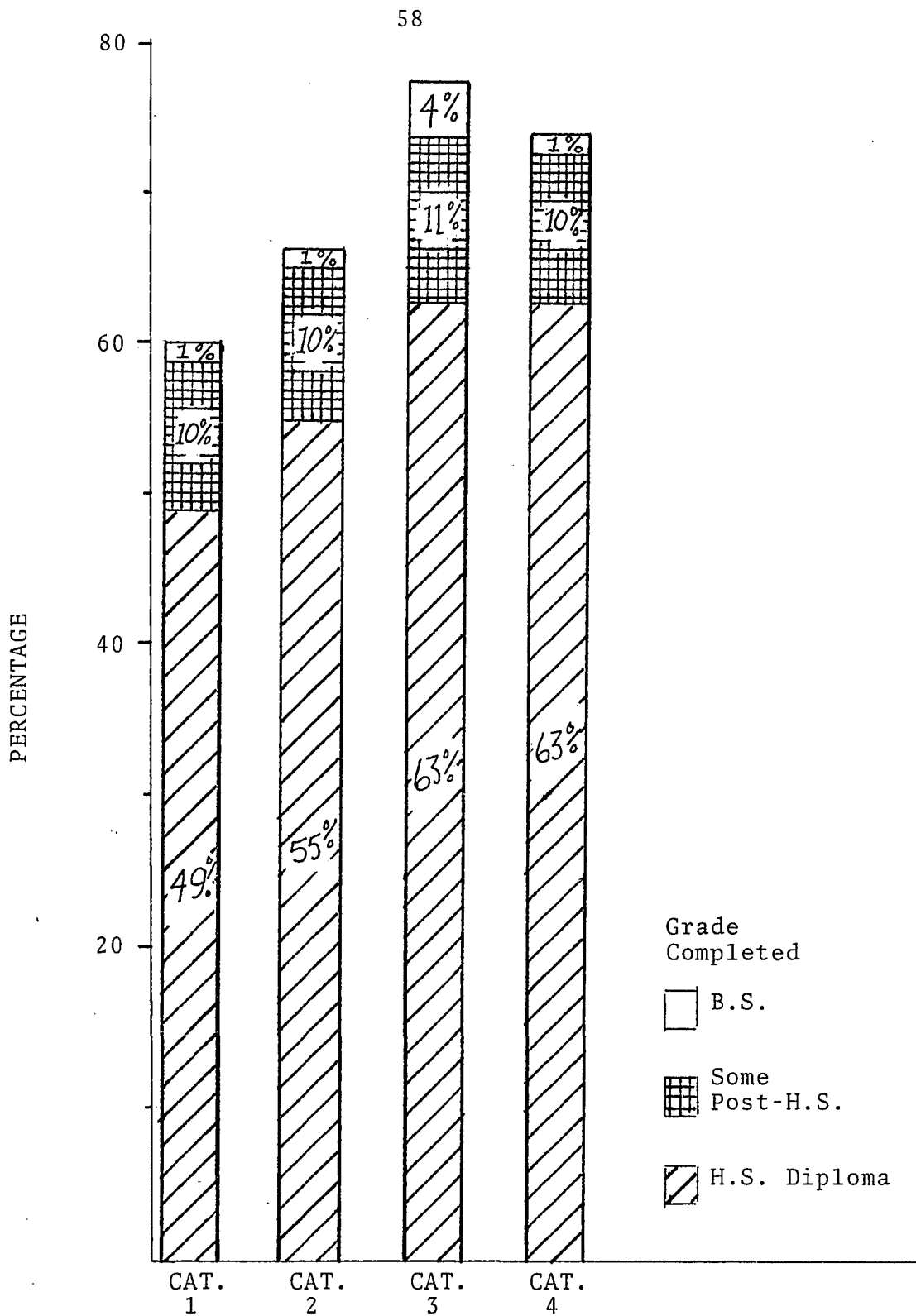


Figure 3-2. Percentage distribution by categories of wage-grade employees with a high school diploma or more

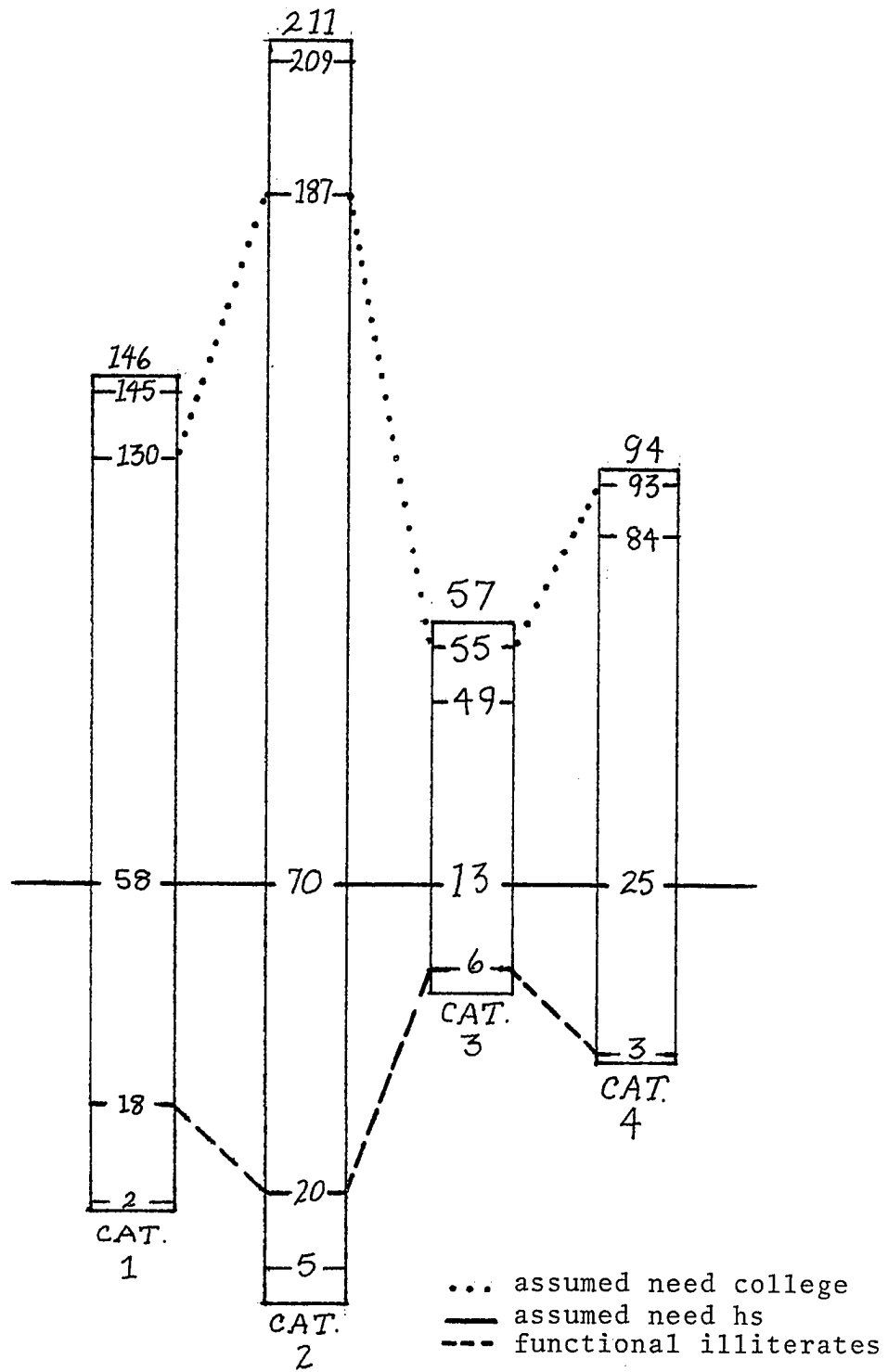


Fig. 3-3. Cumulative representation of educational attainment by category.

of targeted population. The dashed line indicates the number of employees who can be considered functional illiterates in the sample. The solid line represents the number of employees in the sample who have less than the minimum high school education as assumed necessary by shipyard administration. The dotted line indicates the number of the sample who are designated under-educated based on findings from the readability survey.

If these findings are extrapolated from the sample to the entire wage-grade segment of the workforce, the group of employees which would be considered under-educated is large. Based on the assumed educational level needed as indicated with the readability survey, some 6,950 employees at Norfolk Naval Shipyard are under-educated. Even if completion of high school is the minimum educational attainment necessary, then approximately 2,450 employees are under-educated.

Two additional factors need to be considered. Failure to have a high school diploma does not mean that the individual is necessarily uneducated nor unintelligent. Conversely, possession of a high school diploma does not necessarily guarantee present educational achievement to be commensurate with 12th grade reading level and high school mathematical skills. Therefore, even with a survey of the wage-grade workforce, the educational level at which this population is actually functioning cannot be said with complete surety to be tied to a specific level.

Nonetheless, the data gathered from this survey does seem to support the position that the educational attainment level of many of the wage-grade segment of the workforce at Norfolk Naval Shipyard is significantly below the educational level needed for satisfactory interaction with the work environment.

Alternatives to cope with this discrepancy will be suggested in Chapter Four. The alternatives will be described and then analyzed as to the feasibility of implementation of each alternative. The alternative program with the greatest possibility of implementation will be recommended.

CHAPTER FOUR
DESCRIPTION AND ANALYSIS OF SUGGESTED
ALTERNATIVE PROGRAMS OF EMPLOYEE
DEVELOPMENT

Problem Statement

As reported in Chapter Two, the minimum educational level needed in reading skills for wage-grade employees at Norfolk Naval Shipyard appeared to be at least a high school reading level. This needed educational level for blue-collar employees was determined through interviews with production administrators and supervisory training instructors. These individuals had personal knowledge of those skills needed in order to perform the specific tasks under their supervision.

Secondly, readability computations using Edward Fry's formulas for readability were applied to a representative group of directives, process instructions and general documents used at the shipyard. The reading level of these materials was overwhelmingly on a college level. Therefore, both the interviews and the readability survey indicated the importance for all the workforce at Norfolk Naval Shipyard including the wage-grade segment to be capable readers.

Chapter Three reported the results of the survey of the official personnel folders of the wage-grade segment of the workforce at Norfolk Naval Shipyard. This survey represented some 9,000 employees out of the total workforce of approximately 12,000. The last grade of formal education completed was extracted from the sample 508 folders chosen. As previously indicated, a significant number, 33 percent, of the wage-grade workforce have not completed high school.

Furthermore, 88.6 percent of wage-grade employees are probably unable to handle reading on a college level which is the skill level demanded by the directives, process instructions and other documents.

A discrepancy, thus, appears to exist between the educational level at which the shipyard needs, or at least expects, its wage-grade employees to function and the educational level which the wage-grade employees actually have attained. This discrepancy is complicated in that possession of a high school diploma does not guarantee that the individual can read on a twelfth grade reading level. Therefore, the true number of wage-grade employees who do not have the educational skills to perform academically on at least the high school level may be even higher than one-third the wage-grade workforce. Some form of program which attempts to improve the general educational development of the wage-grade workforce, particularly in the basic areas of reading, writing and arithmetic,

would address this discrepancy at Norfolk Naval Shipyard.

Impact of the Problem

The impact of a continued shortfall between the employees' educational attainment and educational achievement needed by the wage-grade segment of the workforce would only increase in importance as new and different technological demands are made on the workforce at Norfolk Naval Shipyard. This impact would not be confined solely to technological considerations, but would also encompass sociological factors as well.

It has been found in other industries that the self-image of employees can affect production.¹ Planter's Peanut Company is an example. An adult education program emphasizing remedial reading for employees was initiated at Planter's Suffolk, Virginia plant. The Director of this program, Mimi Felton, indicated that some of the results of the in-plant, on-clock general educational development program were intangible. Significant numbers of employees at the Suffolk plant had minimal educational backgrounds. The program director said that these employees typically did what was specifically asked of them, but showed little initiative or involvement in the workings of the company outside of their own narrow

¹Interview with Mimi Felton, Director of Adult Learning Center at Planter's Peanut Company, Suffolk, Virginia, 10 February 1981.

routine. After participation in the developmental program, these employees felt pride in their own capability and began to take some initiative for job completion. The employees saw a task which needed to be done and would undertake the task without being told specifically that employee A was to begin task B. In addition, the employees who had participated became involved to the point that if they saw something that did not appear to be operating properly, they would point out the situation to supervisors, whereas earlier they would simply have ignored the situation. The Director credited the employee development program for instilling, in addition to factual knowledge, a sense of confidence in the employees.¹

The impact of an under-educated workforce specifically at Norfolk Naval Shipyard can be both economic and social. If shipyard instructions are written on a college reading level and the wage-grade segment of the workforce is reading on a level approximately four to five years less than that, misunderstanding could arise. Because the wage-grade segment of the workforce represents three-fourths of the entire workforce at Norfolk Naval Shipyard, the discrepancy needs to be addressed.

Description of Proposed Programs

The general goal of any program of basic education development for employees at Norfolk Naval Shipyard would

¹Ibid., 10 February 1981.

be to increase the educational skills of employees, particularly the wage-grade segment of the workforce. Such a program would attempt to provide the opportunity for all wage-grade employees to improve the level of their basic educational skills of reading, writing and arithmetic commensurate with high school achievement level.

This goal would be met through a program to provide the needed educational development. Five alternative suggestions have been explored in the following sections and estimates made as to the feasibility of each alternative for successful implementation. Several feasibility factors have been considered. The alternative with the greatest chance of successful implementation and positive impacts has been determined by comparison of the feasibility factors: costs, number of administrative participants, layers of decisions needed, availability of information, degree of participant initiative required, commitment to the concepts of adult education and expected positive impacts.

The degree of involvement of Code 180, Employee Development, personnel must be considered as an important aspect of the personnel costs factor of the feasibility of the various alternatives. At this point, Employee Development consists of ten employees, excluding clerical support, who supervise and administer all training and education offered at the shipyard. The five suggested alternatives to be considered which will attempt to meet the perceived

general educational needs of the wage-grade segment of the workforce will require varying degrees of commitment and involvement by Code 180. The Employee Development section will be responsible for the administration of any program of general education development. A program which requires a high degree of involvement of the personnel from Code 180 would encounter more difficulties during implementation than any program which would not require a high level of personnel commitment from Code 180.

Financial commitment is the second half of the costs of any program and must be considered when weighing the alternatives for feasibility of implementation. Time commitment can represent a significant financial commitment. Offering a program on-the-clock which is during working hours, rather than off-the-clock which would be after working hours, results in a larger financial outlay. In addition to the costs directly ascribed to the program must be added the costs of lost man-hours for those employees released to attend the program. In Table 4-1, a comparison of on-clock and off-clock costs are illustrated for the same program. Despite the increased costs of an on-clock program, 74 percent of business and industries with over five hundred employees authorized some of their employees to take outside courses during working hours.¹

¹Seymour Lusteran, Education In Industry (New York: The Conference Board, 1977), p. 11.

TABLE 4-1

COST COMPARISONS OF ON-CLOCK
OFF-CLOCK AND HAFF & HALF
CONFIGURATIONS

Cost Commitment	Program all on-clock	Program Half on-Half-Off	Program all off-clock
A=Administration and instruction of program	A	A	A
B=Materials for program	B	B	B
C=Cost for release time	Class hours X No. of parti- cipants X average work- man's salary C	$\frac{1}{2}$ class hours X No. of partici- pants X average workman's salary $\frac{1}{2}C$	None
Total Costs	A+B+C*	A+B+ $\frac{1}{2}C$	A+B

*Must also consider that if offer on-clock might have more participants.

The number of administrative participants is another important factor to consider when comparing alternatives. The more administrative participants, the greater the likelihood of divergence in perspective of the goals of any program should be run.

Another important feasibility factor is the number of layers of decisions necessary for program approval. When

multiple layers of approval are necessary for a program to be implemented, there is a greater chance of some decision-maker along the chain stopping the program.

The availability of information is a critical factor for implementation. An alternative which depends on hard-to-obtain or non-existent information is less assured of successful implementation than an alternative which incorporates readily available information.

The next two feasibility factors are directly related to the specific target population at Norfolk Naval Shipyard. One characteristic of an under-educated adult who has probably experienced repeated failures in educational situations is a difficulty in initiating action to remediate any deficiencies. The more initiative required from this population in order to participate in any program, the fewer employees who will become involved.

Similarly, the degree of commitment to the concepts of adult education is linked to the specific population. All the alternatives address education programs for adults. Adults interact in the learning situation differently than children do. There is a relationship between the degree of teaching which is compatible with the concepts of adult education and success for adults in learning situations.

Suggested Alternatives

Alternative One, Clearing House

Code 180, Employee Development, can function as a

clearing house of information of adult and continuing education offerings in the Tidewater area. Code 180 can collect all pertinent data on such offerings and disseminate this information to shipyard employees. This information would include adult education brochures from Norfolk, Portsmouth and Virginia Beach public school systems and special classes that would be offered at Tidewater Community College.

Code 180 is situated in Building 400 which is removed from the industrial area where the majority of wage-grade employees work. Maintaining a reference corner for this information in Building 400 would not be the most conducive method of dispersal. A better method would be to use the supervisory training instructors and the training instructors who have contact both with the personnel in Code 180 and with the waterfront employee as a conduit for information.

The financial costs for this alternative are minimal in that all materials to be procured are free. No release time and its subsequent costs for employees would be involved. The personnel commitments from Code 180 are also minimal. No additional personnel would be needed. However, the cooperation of the supervisory training instructors and the training instructors would be of paramount importance.

Alternative Two, Portsmouth
Public School System

The public school systems in the Tidewater area particularly Norfolk, Virginia Beach, and Portsmouth, Virginia, offer programs of adult education. These programs include adult basic education which is for those individuals with less than an eighth grade education and G.E.D. preparatory classes which prepares the adult student to take the General Educational Development, G.E.D., examination. Passing the G.E.D. examination is generally considered the equivalent of completing high school. Colleges accept a G.E.D. certificate the same as a high school diploma.

Another alternative method to provide educational development for wage-grade employees would be to establish a relationship with the Portsmouth Public School System to provide, cooperatively, adult education classes at the shipyard. Portsmouth's normal G.E.D. preparatory courses are offered for 16 weeks, four times per week during fall and spring semesters. Fall semester is from September to December and spring semester is from January to April. This course is approximately 200 hours in length and costs \$60.00. Portsmouth also offers an abbreviated course in the summer for \$30.00.

A previous attempt was made at the shipyard to provide such a program. An adult education class was offered at the shipyard with the participants allowed release time for half of the time spent in class. Portsmouth School System

supplied the instructor and all materials. The shipyard provided space and paid the employees' course fee. No records exist at the shipyard on this former program other than personal recollections of several Code 180 personnel and former supervisory training instructors. According to these individuals, the previous program was not successful. The on-clock release time was abused by the participants. None of the participants passed the G.E.D. at the end of the course. The lingering negative feelings toward Portsmouth School System Adult Education Department would influence any future relationship between the shipyard and the school system.

If an adult educational program of the same general arrangement as before were offered totally after hours instead of the former arrangement of half-on and half-off, the problem of release-time abuse would be eliminated.

This alternative does not place any demands on Code 180 personnel. In addition, if offered off-clock the costs accrued amount to the number of participants times Portsmouth's fee for the course, \$60.00. The use of an existing program means that no new materials need to be development or purchased. However, a disadvantage of using an outside program would be that nothing would be tailored specifically to the shipyard and to shipyard needs.

Alternative Three, Shipyard Adult Learning Center

A third alternative program for general educational development at Norfolk Naval Shipyard would be for the ship-

yard to establish its own Adult Learning Center. Through such a center, the specific educational needs of the shipyard could be coordinated into a specific curriculum.

A director for the Learning Center would be appointed to coordinate the specific needs of the shipyard as relates to workers who would participate in the center and the specific curriculum needs of the shipyard.

The Learning Center would operate Monday through Thursday from 4:15 to 7:25 p.m. Workers who ask to participate would be administered a diagnostic battery including an Informal Reading Inventory for adults (IRI), the Slosson Oral Reading Test (SORT), the Slosson Short Intelligence Test (SIT) and a mathematics abilities test. This battery can be administered in less than one hour. An individual contract would be developed for each participant determined by an analysis of the diagnostic information. The employee would participate in setting the goals of the contract.

The employee would be obligated to attend the Learning Center for a minimum of two hours twice a week for a ten-week period for a total of 40 hours. The employee would be evaluated in terms of his learning contract. The employee would have entered into an agreement whereby satisfactory completion of a ten-week, 40-hour minimum, cycle results in no cost to the employee. However, unsatisfactory work results in a \$15.00 Learning Center fee.

One teacher would be needed for every 15 participants. One teacher can handle this load in that not all 15 would

be in the Learning Center all the time.

This alternative would necessitate appointing someone as teacher/coordinator for the ten week sessions. Since the center would be opened in late afternoon and early evening, it is feasible to assume that a teacher/coordinator could be hired on a consultant request form from the pool of qualified educators in the Tidewater area. The cost for such personnel for one ten week course cycle would be \$1,440.00. There would be additional costs for materials and supplies. For a ten week course, the development of specific materials and books for a minimum of 15 participants would involve an additional cost of approximately \$500.00.

Using an outside consultant places no additional load on Code 180 personnel. The possibility of positive impacts arising from this alternative is high. The Learning Center could be attuned to specific needs of the shipyard and would be able to deal with the participants as individuals. The Learning Center would be tied directly to on-the-job requirements. In addition, the shipyard would be in control of the situation.

The financial costs for this alternative can further be considered from three different perspectives. Additionally, each perspective is coupled with greater or fewer barriers to implementation. The financial costs hinge on when the Learning Center is to operate. If the center is to be open only after hours, then the costs are as outlined above for materials and for the teacher/coordinator. As

such, the approximately \$2,000.00 represents considerable outlay for the number of employees who would benefit.

However, if the Learning Center were to be open during working hours and participants were allowed release time to come to the Center, the actual costs to the shipyard for this alternative would increase by the number of participants times the number of hours of class times the average workman's salary.

A middle ground is possible with the Learning Center open straddling the shift change and participants granted half release time; that is, of the four hours of class time per week, two hours would be release-time and two hours would be after hours. The comparable costs for completely on-clock participation, completely off-clock participation and a half-and-half situation are summarized in Table 4-1.

Approval from the upper management at the shipyard for the alternative associated with the higher costs would probably be more difficult to attain than the less expensive arrangement.

Use of release time means not only the hard cash outlay, but also that members of the workforce will be gone for a portion of the day. There are no substitutes to be called in to handle the participant's job when he leaves the waterfront for the Learning Center. The same situation will be true if any of the other alternatives are considered to take place on-clock as opposed to off-clock.

Alternative Four, Tidewater
Community College

The Frederick Campus of Tidewater Community College, the area's two-year junior college with campuses in Portsmouth, Norfolk, Virginia Beach and Chesapeake, offers college credit courses at Norfolk Naval Shipyard. T.C.C. teachers are provided with special clearance to come inside the gates and teach classes after hours in Building 400. This relationship is for the convenience of the shipyard employees. Employees who wish may sign up for a desired class at the shipyard and attend the class immediately after work hours instead of the employee going home and having to drive later to a campus somewhere for the class. This arrangement between T.C.C. and Norfolk Naval Shipyard has been in effect for several years.

Another alternative program for general educational development offerings for shipyard employees in order to alleviate the supposed discrepancy between shipyard educational needs and employee educational achievement would be to enhance further the relationship between T.C.C. and the shipyard to include general educational courses. The Frederick Campus of T.C.C. includes in its catalog and regularly offers at their main campus such general educational course as:

Verbal Studies Laboratory - a developmental course in writing designed for students who need help in all areas of writing to bring their proficiency to the level necessary for entrance into their respective curricula. Emphasis on individual instruction

Basic Skills in Reading I - an individualized course designed to help students improve basic comprehension and word attack skills

Basic Skills in Reading II - designed to help students improve reading rate and build such skills as finding and remembering facts, making inferences, drawing conclusions and getting meaning from context

Reading Improvement - a developmental course using modern techniques, equipment and materials to increase the student's comprehension, skill and speed in reading

Developmental Reading - a course designed with the use of modern techniques, equipment and materials to increase the student's comprehension and skills in reading

Vocabulary Laboratory - a developmental course in vocabulary designed to improve writing skills and reading comprehension

Developmental Mathematics - a developmental course which bridges the gap between a weak mathematical foundation and the knowledge necessary for the study of mathematical courses

Basic Arithmetic - a developmental course in review of arithmetic principles and computations, designed to develop the mathematical proficiency necessary

These cited courses could be very beneficial for shipyard employees in order to improve their general educational foundations. The courses would be particularly helpful if the course content could be geared to the specific needs of the shipyard. The Assistant Director of Continuing Education at the Frederick Campus would be the liaison administrator. The department chairmen of the English department and the math department would also need to be involved in the planning of a sequence of course offerings.

There are disadvantages, however, to this alternative. Whether T.C.C. would be able to provide a teacher to come

¹Tidewater Community College Catalog 1980-81, pp. 154-155 and 170.

to the shipyard for a particular course would depend in part on demands on the faculty to staff courses offered at the main campus. For example, during fall semester, usually all of the reading teachers are employed full-time at the Frederick Campus so that there is often no one free to handle a class held at the shipyard for fall semester. In order for this alternative to be a viable one, the shipyard must be able to depend on T.C.C. to provide instructors throughout the year. Otherwise, the program becomes a hit-or-miss proposition. It would be difficult to establish a positive network among employees if possible students could not count on there being a course offered.

In terms of costs, this alternative has many advantages. The financial outlay would be minimal. One three-hour course from T.C.C. costs \$32.00. An employee who participates would submit a form D 1556 to his administrative officer when he registers. The employee would pay T.C.C.'s \$32.00 fee at registration. Upon satisfactory completion of the course, the employee would be reimbursed by the shipyard for the course fee. Therefore, the only financial cost to the shipyard would be \$32.00 times the number of participants who complete the course.

This program would be offered completely after hours. The usual schedule for T.C.C. classes is a three-hour once-a-week session from 4:15 to 7:15 p.m. Thus, the difficulties associated with offering a program on-clock or half-and-half would not be encountered. The cost of Code 180

personnel commitment is also minimal. The registering and teaching would be staffed by T.C.C. personnel and not by Code 180 employees.

Alternative Five,
Pilot Project

This fifth alternative program is a variation of the preceding two alternatives and seeks to combine the positive aspects of both. The shipyard would work with the Frederick Campus of Tidewater Community College to provide a pilot project for shipyard educational development. The instructor for the course would come, as in Alternative Four, from T.C.C. Courses from T.C.C.'s catalog would still be used. Input from the shipyard, however, would attempt to pinpoint the specific needs of specific areas in the shipyard.

In this pilot project, only one division of the Production Department, Code 970, would be chosen to participate. A coordinator with a background in reading, in conjunction with the STIs would examine training manuals and shop procedures to determine key vocabulary and concepts needed to perform successfully in training programs and to respond accurately to the required printed job certifications and printed job instructions. Only employees from Shops 06, 64, 71, 72 and 99 would be allowed to participate.

The course of Developmental Reading Skills would incorporate the specific shop needs for each individual. The course would meet once a week for ten weeks from 4:15 to 7:15 p.m. The course would be taught in the training room

in Building 298.

Because this approach is tied directly to on-the-job needs, the shipyard would underwrite all expenses at the beginning of the course. If the employee, however, does not satisfactorily complete the course, he would be responsible for reimbursing the shipyard for the course fee.

If concentration is focused on one production code division, perhaps a greater number of those employees who could benefit from such a program would sign up for the course. When a course is offered after hours and will last through the early evening, the motivation for becoming involved in the program must be high.

Analysis of Feasibility Factors

Estimates of Costs

The costs of these five different suggestions of programs to improve the general educational level of the wage-grade segment of the workforce at Norfolk Naval Shipyard are subdivided into two separate categories: 1) financial costs, that is, money which the shipyard will have to expend either directly or indirectly and 2) personnel costs, that is, the number of personnel in Employee Development which would have to be assigned to this project in order to implement the program.

Both costs are important. Any program of general educational development would come under the administrative responsibility of Code 180, Employee Development. The pro-

gram's budget would be incorporated into Code 180's budget. Any program would, at this time, mean an added task with no new personnel added. Therefore, an alternative which requires heavy time commitment from Code 180 staff would be judged as costly in terms of personnel commitment. Conversely, an alternative which can make use of outside sources of personnel would be judged as less costly and thus more feasible for successful implementation.

The financial costs of these alternatives are either direct or indirect financial outlays. Most of the alternatives' costs are straightforward: course fees, coordinator consultant salary, etc. If, however, any of these alternatives is offered partly or wholly during working hours, significant indirect costs appear. Alternative Three, Shipyard Learning Center, can be used as an example. If the Learning Center is offered on a half-and-half schedule as discussed earlier, then the costs for one ten-week session for 15 participants increases from the estimated \$2,000.00 to \$5,000.00. The added \$3,000.00 is cost of salary for released time computed as the 15 participants times a \$10.00 average wage times the 20 hours of release time. If the program were offered totally on-clock, the costs for 15 participants would escalate to \$8,000.00.

The most important cost to the shipyard, however, is impossible to quantify. Because of the current economic situation and because of naval restructuring, Norfolk Naval Shipyard is being asked to produce more work with fewer

people. At the current level of approximately 12,000 employees, the workforce is far below the World War II high of over 42,000 employees. Each time that an employee is released from work early means that some task does not get done.

Much of the work at the shipyard is sequential in nature. Few tasks stand alone; most are dependent on preceding tasks and are themselves tied in to following procedures. Thus, one employee's absence affects not only the specific job at hand, but also subsequent tasks.

In summary, the combined comparable costs for the five alternative programs for general educational development at Norfolk Naval Shipyard are estimated as follows. The financial costs for Alternative One, Clearing House, involve no cash outlay except for printing for any bulletins or brochures. The personnel costs are also minimal in the time commitment necessary from Code 180 personnel.

For Alternative Two, Portsmouth Public School, the financial costs involve the amount of the course fee for each participant upon successful completion of the course. For a comparison figure, 15 participants would account for a \$900.00 outlay. The time commitment for Code 180 personnel would be minimal for this alternative, also. Teaching would be done by Portsmouth resources.

For the third alternative, Shipyard Learning Center, the financial costs would be considerable. The salary for the teacher/coordinator for one ten-week session would be

\$1,440.00. An additional \$500.00 would be needed for books and materials totaling an approximate \$2,000.00 for one session. This estimate applies only if the Learning Center is operated totally off-clock. As indicated earlier, the costs would be higher if the Learning Center were open either half-on and half-off the clock or all on-clock.

The personnel costs for the third alternative would include one person designated the teacher/coordinator. This person could come either from inside the shipyard or, through use of the consultant request form, could be hired from outside the shipyard.

For Alternative Four, Tidewater Community College, the financial costs would simply be the number of participants times the fee for the course, \$32.00. For comparison, this amount for a group of 15 participants would be \$480.00.

The personnel costs would be minimal. Code 180 would not be responsible for organizing or teaching any of the courses. Tidewater Community College even handles the registration for the courses.

For Alternative Five, the Pilot Project, the financial costs would include the same \$480.00 T.C.C. fee for 15 participants for one course plus approximately \$800.00 for an outside consultant for curriculum development for a total cash outlay of \$1,280.00.

The additional personnel position would not be filled from within Code 180. An outside consultant would be hired instead. Therefore, no additional task burden would fall on

Code 180 personnel.

This information of the costs of the five alternatives is presented in comparative form in Figure 4-1.

Estimates of Number of Administrative Participants

When estimating the implementation feasibility of a suggested alternative, several factors must be considered. Costs involved, both financial and personnel, is an important factor. This aspect has already been weighed in the preceding section. Pressman and Wildavsky indicate several other possible barriers to implementation of programs in Implementation. One barrier arises from a "multiplicity of participants and perspectives."¹

Alternative One, Clearing House, however, does not involve multiple levels of participants and would, thus, not encounter this barrier.

Alternative Two, Portsmouth Public School, does involve multiple participants and the possibility of multiple perspectives. For example, the Portsmouth Public School System may have a perspective of which particular reading skills are most important and what examples to use to illustrate those skills. These skills and examples may be different from those skills and examples needed by an under-educated employee of Shop 06 at the shipyard.

¹Jeffrey L. Pressman and Aaron Wildavsky, Implementation (Berkeley, California: University of California Press, 1979), p. 94.

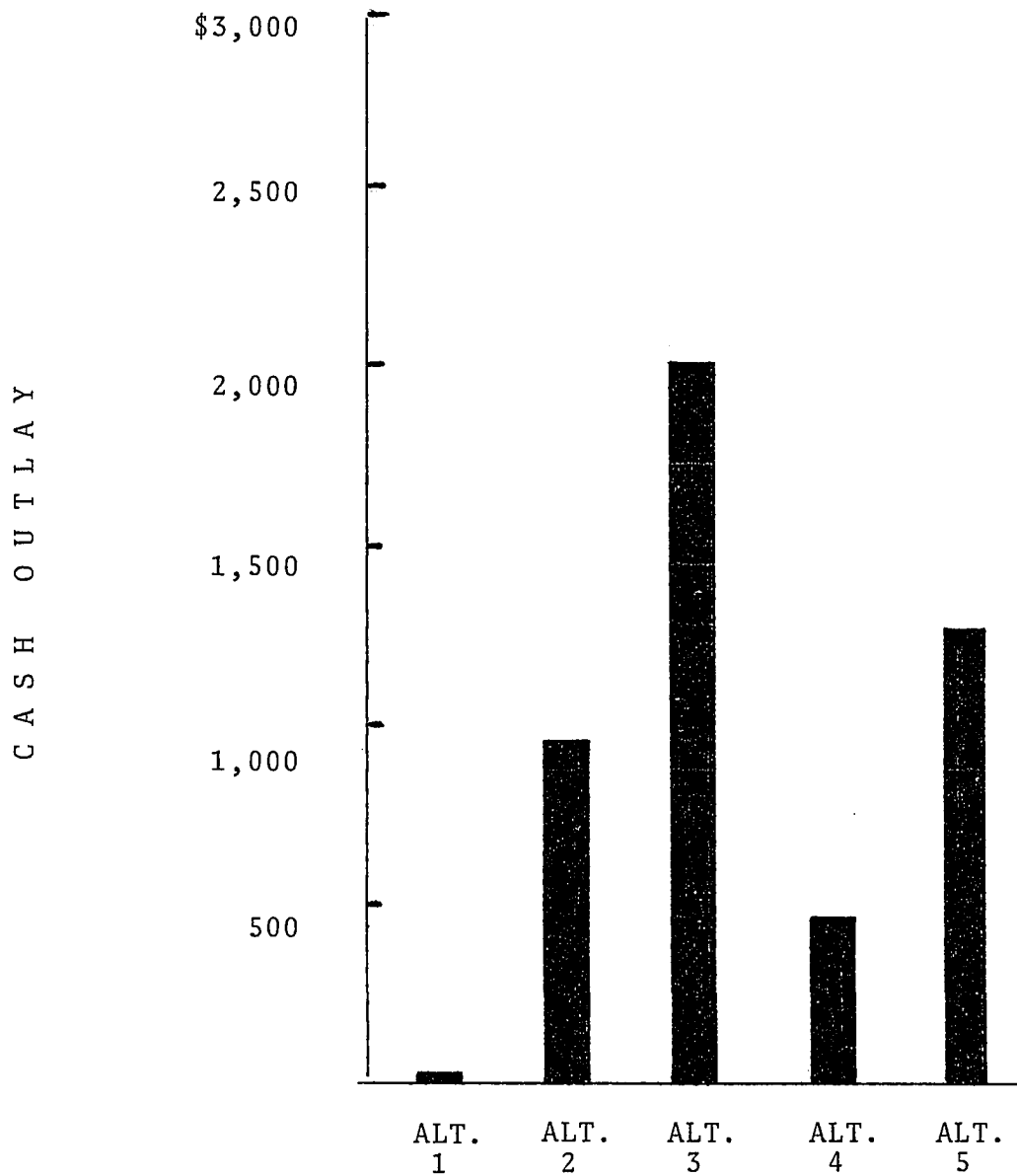


Fig. 4-1. Comparison of financial costs for one off-clock session with 15 participants

Alternative Three, Shipyard Learning Center, would have only the shipyard as administrative participant. Thus, this alternative would have no conflict of perspective.

Alternative Four, Tidewater Community College, encounters this possible barrier of divergent administrative perspective. Tidewater Community College's goals may not be the same as the shipyard's goals.

Alternative Five, Pilot Project, seeks to control for this preceding possible barrier to program implementation. This program coordinator would be a link between the shipyard and Tidewater Community College to assure cross communication in developing goals and objectives.

A comparison of the number of administrative participants is presented in Figure 4-2.

Estimates of Layers of Decision Making

An additional barrier suggest by Pressman and Wildavsky involves, "The multiplicity of decisions and the decreasing probability of program success....When a program depends on many actors, there are numerous possibilities for disagreement and delay."¹

In order to implement Alternative One, Clearing House, only the administration in Employee Development must approve. The decision does not need other approval either

¹Ibid., p. 102.

from inside or from outside of the shipyard.

For Alternative Two, Portsmouth Public School, Employee Development again has the authority to grant permission to allow the school system to present a course inside the shipyard. The decision, however, is two-ended. Portsmouth school officials must also approve entering into a relationship with the shipyard.

For Alternative Three, Shipyard Learning Center, the layers of approval are totally internal. However, this alternative would have to gain approval through the layers of organization within the shipyard, a process which can be difficult.

Alternative Four, Tidewater Community College, encounters the same degree of multiple decision-makers as in Alternative Two. Both the shipyard administration and Tidewater Community College administration would have to approve the relationship.

Alternative Five, Pilot Project, experiences the same layers of decision-makers and the possibility of an impediment to implementation as does Alternative Four. Alternative Five also seeks to establish a relationship with Tidewater Community College. Approval for the extra teacher/coordinator does not necessitate extra layers of internal decision-makers.

Figure 4-3 presents a comparison of the layers of decision-making necessary for implementation of the five alternatives.

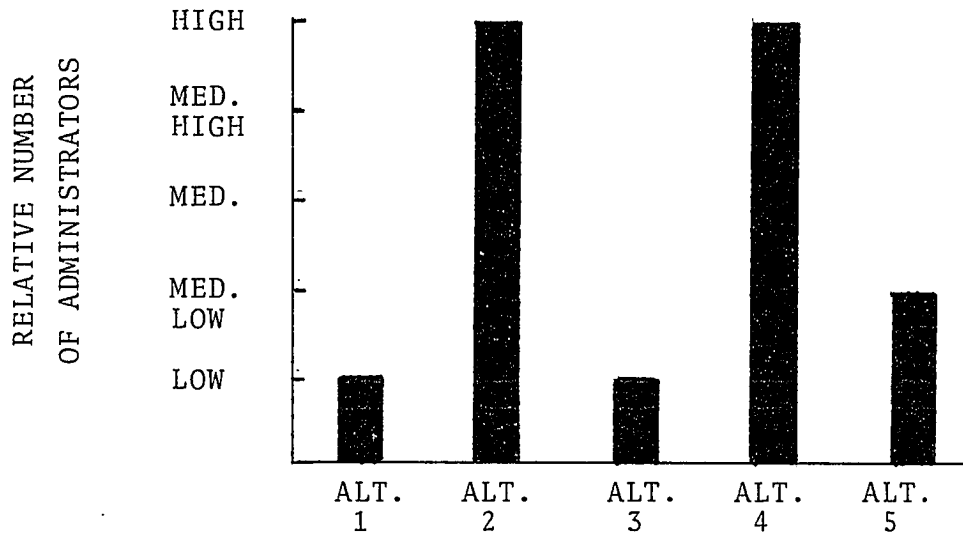


Fig. 4-2. Comparison of numbers of administrative participants

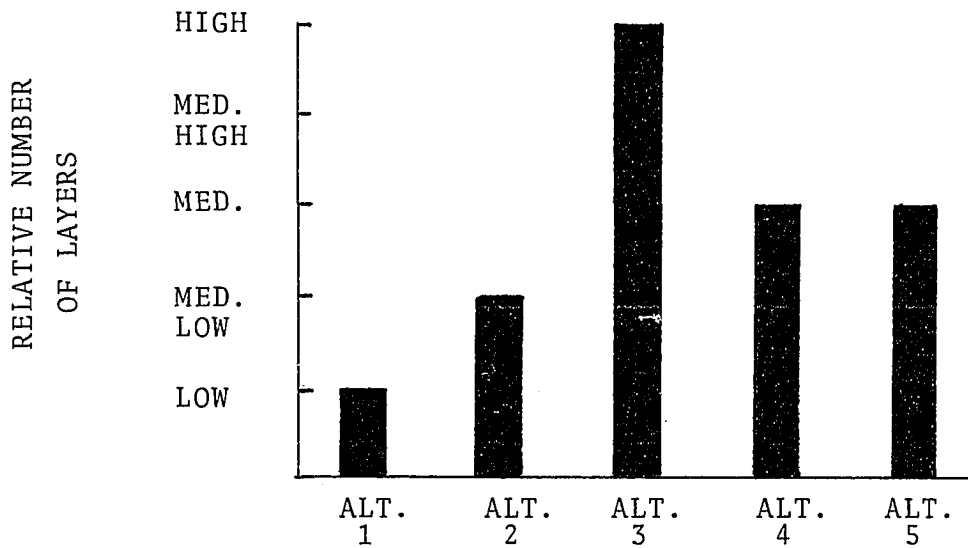


Fig. 4-3. Comparison of layers of decision making

Estimates of Availability of Information

The availability of information or technology needed for a particular alternative is another possible barrier to implementation. An idea may be good and the possibility for positive impacts from the idea high, but if some ingredients are missing, then the alternative is usually not worth pursuing.

Alternative One, Clearing House, for example, would be meaningless if there were no brochures available for distribution. The information to be disseminated, however, is readily available. Therefore, this potential problem does not affect Alternative One.

Alternative Two, Portsmouth Public School, also would not experience any major difficulties in this area. The Portsmouth Public School System already operates an adult education program. The shipyard would not have to wait for the school system to develop a program before the shipyard could tie into it. The only difficulty would arise if the school system would not be able to deliver the courses at a time which would be convenient for the shipyard.

Alternative Three, Shipyard Learning Center, is the alternative for which this possible barrier to implementation might be most difficult. Adult Learning Centers for businesses and industries have been developed. Guides

exist to help set up such programs.¹ Indeed, in the Tidewater area, Planter's Peanut Company in conjunction with the state Adult Education Department has printed a guide for establishing adult learning centers in business and industry.² The expertise exists, but would need to be tailored specifically to Norfolk Naval Shipyard needs.

Alternative Four, Tidewater Community College, offers courses which are already being offered by the college. No new courses need to be developed. Any difficulty in the availability of information arises not from the courses themselves, but from the availability of faculty from Tidewater Community College to be assigned to the shipyard to teach the specific course which the shipyard needs.

Alternative Five, Pilot Project, shares the same possible barrier to implementation as Alternative Four with an added dimension. If this alternative is to address the specific needs of individual shops within the shipyard, then the information of the specific requirements must be garnered from the various shops. This information is not readily available in already usable form. The information must first be extracted and then developed. Nevertheless,

¹Center for Vocational Education, Guidelines for the Development and Study of Cooperative Adult Education Programs (Columbus, Ohio: The Center for Vocational Education, The Ohio State University, 1975).

²Mimi E. Felton, Handbook for the Development of a Cooperative Adult Basic Education Program in Industry (Suffolk, Virginia: Suffolk City Schools and Planter's Peanuts, 1979).

the needed information is available and the expertise to render it useful is also available.

A comparison of the difficulty in obtaining necessary information for the five alternatives is presented in Figure 4-4.

Estimates of Participants' Initiative Required

If action is a required response from the targeted population in order for an alternative to be effective, then some knowledge of the general characteristics of the targeted population is necessary to come to conclusions of possible participation in any program. Adults whose academic skills are less than average may have experienced years of failure in the public school system. Failure would not generally have occurred overnight. The pattern of lack of success at academic tasks usually begins early and feeds on itself. The child who does not master third grade reading skills usually finds fourth grade assignments even harder. Each year the problem is exacerbated.

Tied into the lack of success in academic endeavors, typically, is a lack of self-confidence. The individual's sense of self is constantly assaulted by confrontations with today's academically demanding environment. The adult who feels that he is not capable of functioning competitively in this literate society creates a wall of defenses to protect himself from situations of potential failure. The supervisory training instructors at Norfolk Naval Shipyard

all had anecdotes of employees' excuses for not reading instructions or training materials.

The shipyard employees who have not completed high school, some 3,000 employees as indicated by the survey described in Chapter Three, usually possess this characteristic. The employees' defenses have been constructed such that for the employee to admit to himself and to others that he has a problem with his general educational development is a major hurdle. If the employee must be the one to initiate action to remediate his deficiencies, then fewer of those who could benefit from a program for general educational development will partake of it than if the program itself seeks out the participants. Each of these five alternatives can be judged on the degree of action required by the target population. The more initiative which must come from the employee, the less likely that the employee will participate in the program.

Alternative One, Clearing House, involves little contact with the projected population of need. This alternative is a passive program. Information is gathered, but all action must come from employees' initiative. Thus, this alternative has a poor prospect of involving many of the employees in a program of change. The demands for change are totally on the employee.

Alternative Two, Portsmouth Public Schools, brings the desired program one step closer to the targeted population. The employees do not have to go outside to seek out their

own program.

Alternative Three, Learning Center, brings the program down to the employees and makes it accessible. Thus, this alternative does not require the initiative level from the potential participants that the preceding two alternatives do. A greater percentage of those who need the program may make use of it.

Alternative Four, Tidewater Community College, may be judged as requiring mixed involvement from potential students. The employee who is under-educated must realize that fact and take the steps on his own to register for the general developmental course during Tidewater Community College's scheduled registration period. Opportunity is provided to register in the shipyard; the employee does not have to go to the Frederick Campus to register. If the employee wishes to be reimbursed, however, he must fill out a form D 1556 prior to registration. This form is filled out with the employee's administrative officer or supervisory training instructor. The potential student must contact, on his own time, the proper administrator and admit that he wants to take a developmental course. Therefore, the estimates of participation in this alternative are mixed.

Alternative Five, Pilot Project, retains some of the disadvantages of Alternative Four. If an employee wishes to be reimbursed, then he must still fill out form D 1556. The initiative remains primarily with the potential

participant. This alternative, however, limits participation to the five shops of 970 production group. The class would be held in the training room of Building 298, the building where many of these employees work. If one group is focused upon, greater involvement can be elicited from the STIs and the TIs to identify those employees who might most benefit from a program and to persuade them to participate. Thus, part of the responsibility for becoming involved is shifted to forces outside of the targeted population. For these reasons, this alternative has the greatest possibility of soliciting participation in the program.

In Figure 4-5, a comparison of the five alternatives for this feasibility factor is presented.

Estimates of the Use of Andragogy

Another criteria for judging the probability of program effectiveness is the extent to which a program incorporates the theory of andragogy. Andragogy, a term first introduced in the United States nearly twenty years ago is the art and science of teaching adults as opposed to pedagogy which is the art and science of teaching children.¹ Andragogy recognizes that an adult learner is different from a child learner. Andragogy is based on four assumptions: (1) the adult learner is self-directed, (2) the

¹Malcolm Knowles, A History of the Adult Education Movement in the United States (Huntington, New York: Robert E. Krieger Publishing Co., 1977), p. 344.

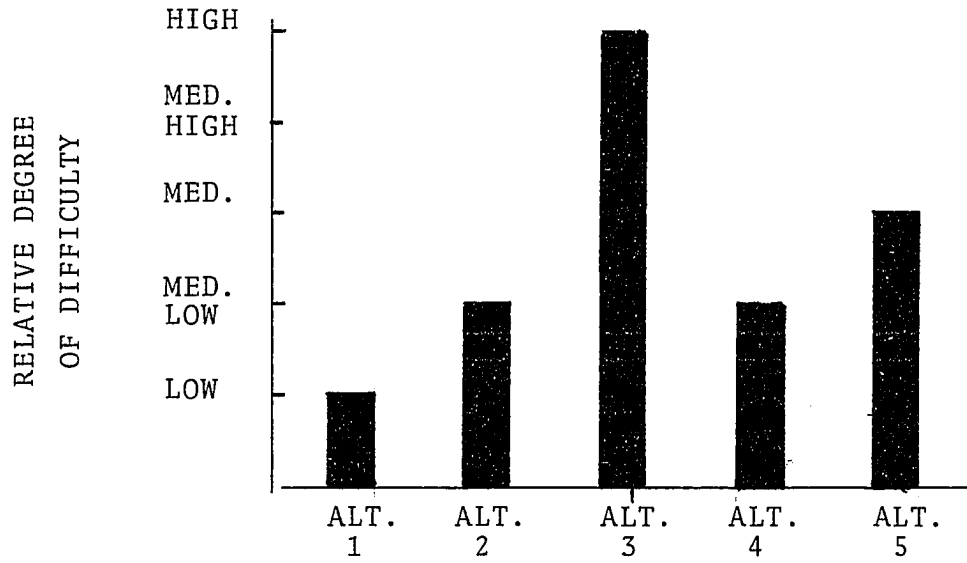


Fig. 4-4. Comparison of difficulty in obtaining information

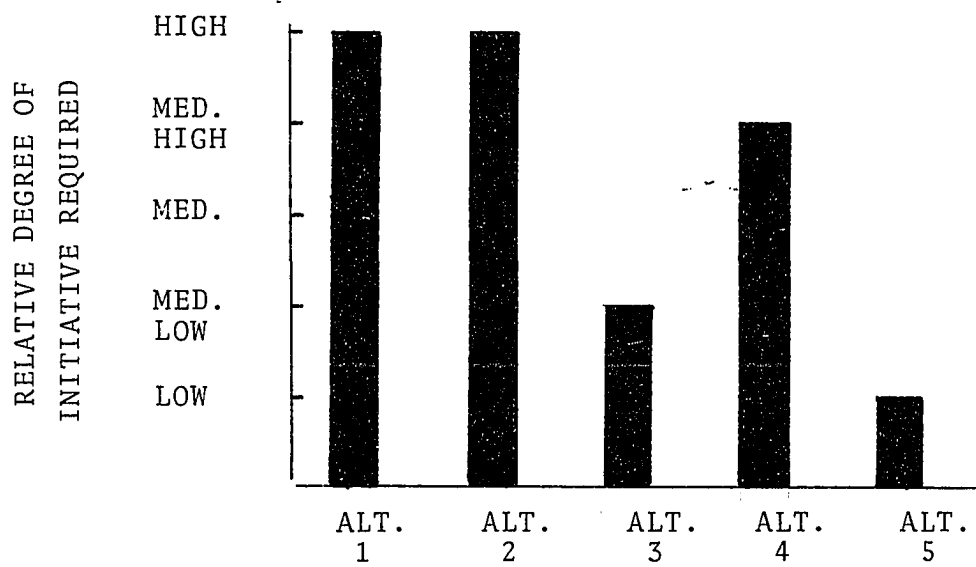


Fig. 4-5. Comparison of participants' initiative required

adult learner brings a wealth of experiences to the learning situation, (3) the adult learner is problem-centered in his orientation to learning, and (4) the adult learner seeks learning experiences because of needs.¹

All of the targeted potential participants in any program of general educational development at Norfolk Naval Shipyard are adults. As adults they would bring to the learning situation a lifetime of experiences, often including the experiences of frustration and failure at school. In addition, if an employee signs up for a course, he will have to admit to himself that he has a need in this area for improvement. As an adult, he would not want to be treated like a child. The concepts of andragogy are important, thus, as a basis for rating alternatives.

Alternative One, Clearing House, does not provide for any interaction between student and facilitator. Therefore, this alternative cannot benefit from any of the positive effects of andragogy.

Alternative Two, Portsmouth Public Schools, is hindered by the lingering negative feelings between the shipyard and the school system. Although the Portsmouth program is especially for adults, there is no guarantee that the instructor will incorporate any of the principles of andragogy in the course. In addition, this program is not specifically orientated to the particular needs of the shipyard

¹Malcolm Knowles, The Adult Learner: A Neglected Species (Houston: Gulf Publishing Co., 1978), pp. 53-59.

employee because the course is designed to meet more general objectives.

Alternative Three, Shipyard Learning Center, provides the opportunity to use those techniques which have been found to be most effective in teaching adults. The center would be problem-oriented dealing with the specific needs of the participants and of the shipyard. The experiences which the participants have had could be used to reinforce the new learning experiences in the center. Therefore, Alternative Three must be rated very highly, that is, favorably, on this criteria.

Alternative Four, Tidewater Community College, is difficult to assess. One would assume that since college students are adults, that college teachers would use the principles of andragogy in their classes. Unfortunately, many college classes are not conducted based on andragogical precepts. Therefore, as the shipyard does not have control of the teaching techniques of whomever Tidewater Community College decides to staff the shipyard position with, this alternative can be judged to benefit from the positive effects of androgagy only partially.

Alternative Five, Pilot Project, attempts to increase the probability of good teaching techniques for adults being employed beyond what might take place in Alternative Four. By limiting the course to one production code and by hiring an extra curriculum coordinator to develop the sets

of examples specific to a shop, it will be possible to control for this effect. Therefore, Alternative Five is rated as highly committed to the concepts of andragogy.

In Figure 4-6, a comparison of the alternatives for this criteria is presented. This comparison is worded as a relative degree of non-commitment to andragogy in order to maintain comparability across feasibility factors. Each of the other feasibility factors has a high rating to indicate a possible problem or barrier and a low rating to indicate only minor foreseeable problems.

Comparison

The five alternatives can be compared based on their rankings of the feasibility factors discussed in this chapter. These feasibility factors provide criteria for judgment of the various alternatives. It is not possible, however, to weigh the factors and conclude that costs assume the highest priority or that the use of andragogy is the next highest in importance. Because the factors themselves cannot be ranked, the rankings across the factors must be assigned equal value. In this manner, a comparative ranking can be achieved totaling all the feasibility factors.

Each feasibility factor has been divided into five possible conditions of low, medium low, medium, medium high, and high. The factors have been worded such that a high rating for each is indicative of possible problems to

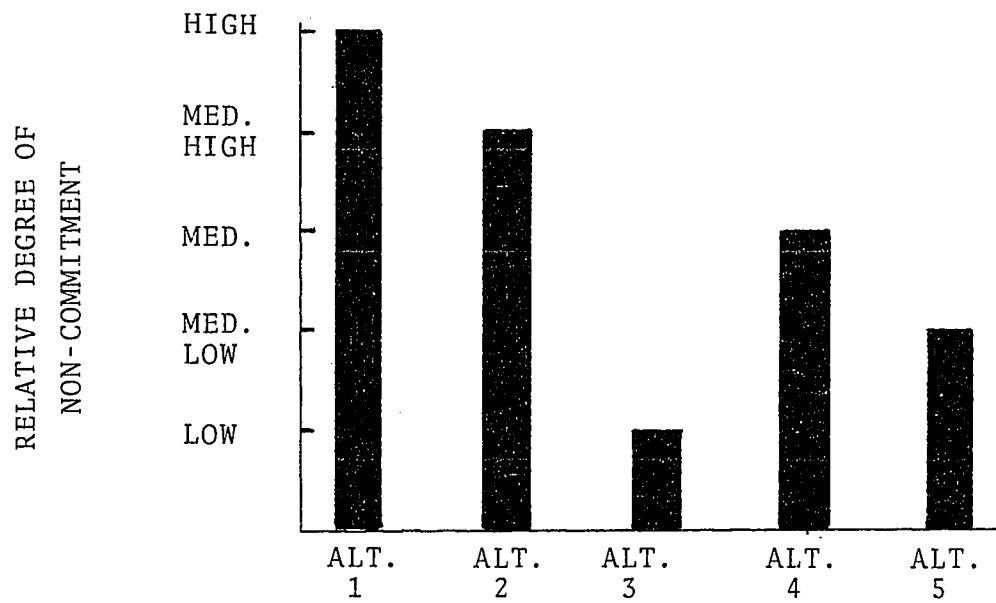


Figure 4-6. Comparison of non-commitment to andragogy

a program. A low rating is indicative of no anticipated difficulty arising from that feasibility factor.

In addition, each division has been assigned a number to correspond with the rankings: low = 1, medium low = 2, medium = 3, medium high = 4 and high = 5. If the scores for an alternative are tabulated across the feasibility factors, a total rating is obtained. The lowest numerical score is the alternative with the greatest possibility of successful implementation based on the selected criteria.

According to the analysis of these criteria, Alternative Five, Pilot Project, ranks as the most feasible alternative. Alternative One, Clearing House, ranks second. Next in feasibility would be Alternative Three, Shipyard Learning Center. Alternative Four, Tidewater Community College, would rank fourth. The least feasible to implement would be Alternative Two, Portsmouth School System. In Table 4-2, the comparisons are presented.

Recommendations

A need has been identified for wage-grade employees at Norfolk Naval Shipyard to be capable in the areas of reading, writing and arithmetic in order to benefit from training sessions and to be able to read and follow through on instructions. In addition, a need has been identified for employees to be able to certify that tasks have been accomplished.

It has also been established that a significant number

TABLE 4-2
ANALYSIS OF FEASIBILITY FACTORS

Alter-natives	Costs	No. of Admin. Personnel	Layers of Decisions	Availability of Information	Positive Impact	Initiative Required	Use of Andra-gogy	Total
ALT. 1	1	1	1	1	5	5	5	19
ALT. 2	3	5	3	2	4	5	4	26
ALT. 3	1	1	5	5	2	2	1	21
ALT. 4	2	5	3	2	3	4	3	22
ALT. 5	3	2	3	3	1	1	2	15

of the blue-collar workforce at Norfolk Naval Shipyard do not possess the educational skills necessary to meet these identified needs. Five alternative programs to remediate this deficiency were developed and subsequently assessed based on feasibility factors which were judged pertinent to the situation.

All of the suggested programs are programs of development--to enhance the employee's well-being and to make him more capable of moving with the organization in the, at this point, unknown future. This research indicates, however, that development programs may be necessary to help meet present job needs. As such, the organization is justified in supporting, indeed, is obliged to support, development programs. Employee development is not a luxury extended to privileged employees during flush economies. Programs of employee development, particularly in the basic educational foundations need to be considered as an integral aspect of the attempt to produce the "total worker" and the viable, flexible workforce.

It is the recommendation of this project that a pilot project in general education development for the blue-collar segment of the workforce at Norfolk Naval Shipyard be instituted. Chapter Five presents a detailed program proposal.

CHAPTER FIVE
IMPLEMENTATION OF EMPLOYEE
DEVELOPMENT PROGRAM

Overview

Review of the Problem

The realm of work in the United States today has undergone changes. It appears that, generally, tasks have increased in complexity which, in turn, has resulted in an increase in the educational standards needed by the workforce in order to complete tasks.

If the educational standards are increasing, then the American workforce as a whole must become better educated. A problem exists for business, industrial or governmental organizations if the educational skills needed to complete the designated tasks are greater than those educational skills which the employees actually possess.

The American workforce encompasses a wide variety of job types with a comparable breadth of educational needs for task accomplishment. However, some minimum standards of educational achievement necessary to function in the 1980's has been proposed in the present work. Those adults with less than an eighth grade education are classified as functional illiterates. Unless an adult's educational

skills, such as reading, writing and arithmetic, are better than those necessary to function in eighth grade, then the individual will find it difficult to deal with modern society's requirements.

Each worker needs to meet the designated standards of educational achievement necessary for successful completion of his job. If not, the employee is no longer a viable link in the interdependent mesh of today's work environment.

Norfolk Naval Shipyard in Portsmouth, Virginia, is a representative organization of the changes which are taking place in the American workplace. Jobs at the shipyard have changed and continue to change. Tasks are sequential in nature rather than being completed in isolation from preceding or subsequent procedures. The employees at the shipyard continually need to update their skills. At times entirely new skills need to be incorporated into the employee's routine. A flexible and viable workforce is needed to meet these conditions.

Discrepancy Between Need and Actuality

Norfolk Naval Shipyard did not know what level of educational skills was needed, particularly for the blue-collar or wage-grade segment of its workforce. Neither had the shipyard determined what degree of educational skills its workforce actually possessed.

One aspect of this research project was to determine

the level of need for educational skills for the wage-grade segment of the workforce at Norfolk Naval Shipyard. Educational skills needed for satisfactory job completion varied widely even among the wage-grade segment of the workforce. An oiler needs far fewer educational skills than a supervisor of the electronics shop. However, all shipyard personnel are exposed to certain common experiences which require certain educational skills which can be determined. This research determined that, overwhelmingly, the printed directives, process instructions and other printed documents which wage-grade employees must read and respond to were written on a college reading level. Other attempts at determining level of educational skills necessary indicated that high school educational skills were minimum requirements. These procedures and results are presented in Chapter Two.

An important finding in this research project is that the educational skill level of the wage-grade segment of the workforce at Norfolk Naval Shipyard is less than that of high school for many of the employees. As reported in Chapter Three, at least one-third of the wage-grade segment of the workforce has not completed high school. Therefore, there appears to be a discrepancy between need and actuality concerning educational skills of reading, writing and arithmetic for the wage-grade segment of the workforce at Norfolk Naval Shipyard.

Means for Alleviating the Discrepancy

It would seem that the noted discrepancy could be approached from two directions. The preceding chapter suggested and analyzed various alternative ideas for establishing a program for general educational development for the wage-grade employees. Each of these alternatives has as its goal the improvement of the general educational skills of the targeted population, the approximately 7,900 blue-collar workers. The basic thrust is to uplift the under-educated workers so all employees meet the educational standards set by the shipyard.

The discrepancy, however, can also be approached from another direction. Rather than improving the educational skills of the employees, the educational standards can be changed to reach the level at which the employees already are functioning. These standards are mostly determined by the reading level at which the vast majority of directives and process instructions are written. Instead of raising the reading level of all wage-grade personnel to a college level of reading expertise, the directives and process instructions can be rewritten on a simpler reading level.

Directives and process instructions are usually written by shipyard personnel for shipyard consumption. A reasonable strategy is to have the writers of the in-house printed material learn how to rewrite information for various reading levels.

This suggestion does not imply that all printed

communications within the shipyard should be written on a ninth grade reading level, or conversely, that writing on a college level is inappropriate. Rather, it is important to be aware of the audience to which the document is addressed. If the audience for a process instruction contains a large percentage of employees whose reading skills are low, then the impact of the instruction can be lost or misinterpreted when the instruction is written on a college reading level. Through a process of becoming aware of target audience achievement level and the rewriting of sentences and the simplifying of vocabulary, the same information can be conveyed at different reading levels. Flexibility is the important point. To this end, a course, Variable Level Writing, will be offered by code 180 for interested department/offices.

Rewriting printed instructions to match targeted employees' reading level helps to bridge the gap. This approach, however, is basically superficial. It only addresses one aspect of the discrepancy and not the root of the problem itself. Directives and process instructions which are generated from within the shipyard would no longer be a problem, but all the printed materials generated outside the shipyard would not be controlled by the yard. The discrepancy would remain. Thus, a permanent approach to the problem of the under-educated employee would be a program to improve the employee's basic educational foundations. Five alternatives were presented in Chapter Four. These

alternatives seek to close the gap between need and actuality on a permanent and individualized basis.

Alternative one, a Clearing House, would inform the wage-grade employees of the opportunities available in the Tidewater area for general educational development experiences.

Alternative two, Contracting with Portsmouth Public School System, would bring an established program of adult education into the shipyard.

Alternative three, the Shipyard Learning Center, would set up an adult learning center in the shipyard. The learning center would develop special curriculum responsive to the needs of the various shops at the shipyard.

Alternative four, Contracting with Tidewater Community College, would establish a series of general educational development courses which the Frederick branch of Tidewater Community College routinely offers.

Alternative five, the Pilot Project, acknowledges the strengths and weaknesses of the preceding two alternatives and seeks to combine the strengths of both. The Pilot Project would retain the relationship with Tidewater Community College but in addition would seek to establish greater individualization and specialization of curriculum to meet shipyard needs.

Each of these alternatives was analyzed according to several feasibility factors as discussed in Chapter Four. Alternative five appeared to be the alternative with the

greatest chance of implementation with positive outcome.

Description of Recommended Program

The Pilot Project attempts to combine the positive attributes of alternatives three and four while attempting to avoid their shortcomings. Alternative three, Shipyard Learning Center, had definite strong points. This proposal was tied tightly to the shipyard. All consideration would have been given to shipyard needs. This alternative would also have embodied many of the ideals and concepts of andragogy. The participants would have been considered adult learners and treated as such. The approach would have emphasized individual tailoring of the curriculum.

The Learning Center alternative had definite negative points, also. This alternative was the most expensive of the suggestions. The Learning Center would have been even more expensive if it were open during working hours as explained earlier in Chapter Four. Another barrier to implementation which this alternative would have experienced was the multiplicity of layers of authority to work with in order to gain approval for the Learning Center.

Alternative four, Contracting with Tidewater Community College, has the Frederick Branch of Tidewater Community College to staff courses in general educational development and to offer these courses to anyone at the shipyard who wishes to participate. Employees would be reimbursed for course costs if they had filled out a special shipyard form

at the time of registration. Tidewater Community College has in its catalog courses which would be relevant to the needs of the shipyard.

This alternative, however, also has drawbacks. A serious negative feature involves the nature of the targeted population. The adult who is under-educated for his job and also unable to function easily in today's highly literate society has developed defense mechanisms.¹ It is often difficult for the functionally illiterate adult to admit that he has an educational deficiency. It is often even more difficult for that adult to take the initiative to seek out opportunities for improvement and to become involved. Alternative four leaves the initiative to the employee. It merely provides an opportunity at a rather convenient time in a rather inconvenient place.

In the recommended alternative, a Pilot Project, a direct route of recruitment with minimum initiative required from the potential participants is added to the possibility of individualization of instruction found in Alternative three.

The relationship between the shipyard and Tidewater Community College would continue. The Frederick Campus of T.C.C. would staff courses of educational development.

In addition, the shipyard would appoint a coordinator

¹John R. Verduin, Harry G. Miller and Charles E. Greer, Adults Teaching Adults (Austin, Texas: Learning Concepts, 1977. p. 14.

who would help pinpoint the specific needs of specific areas of the production code which would participate in the pilot project. Shops 06, 64, 71, 72 and 99, all part of code 970, would be the chosen representatives of the industrial sector of the shipyard to participate in the pilot project. The coordinator, with a background in reading, in conjunction with the supervisory training instructors of these shops, would examine training manuals and shop procedures to determine key vocabulary and concepts necessary for successful completion of training programs and for accurate response to required printed job certifications and job instructions. The coordinator would be responsible for recruiting possible participants and assisting in the registration for the development course. The coordinator would also be responsible for conducting the evaluation component of the program.

The course would meet once a week for ten weeks from 4:15 p.m. to 7:15 p.m. The course would be taught in the training room in Building 298 which is the base building for most of these shops and where the training takes place for shops 64, 71, 72 and 99.

These shops were chosen to be included in the pilot project because it appeared that considerable numbers of potential participants would come from these shops. Shop 06 is the Central Tool shop and includes a variety of jobs and subsequent educational needs. A considerable number of the lowest ratings in the shipyard are in shop 06. The same is

true for shop 64, woodworking; shop 71, painters; shop 72, riggers and laborers; and shop 99, temporary services shop. This decision was made based on recommendations of administrators and examination of job descriptions in the shops.

Program Objectives and Tasks

The suggested program of general educational development seeks to raise the educational foundations of Norfolk Naval Shipyard employees commensurate with high school achievement. This program will seek to eliminate the discrepancy between the educational skills needed and the educational skills actually possessed by the workforce at Norfolk Naval Shipyard. A subsequent objective of this program of general educational development is to create a viable and flexible workforce at the shipyard. Figure 5-1 presents program objectives and the path to accomplishing the objective.

The first task of this program is to identify and to recruit potential participants. The appointed coordinator will work with administrative officers, supervisory training instructors and training instructors to identify those employees who would benefit from the program. The training personnel will submit lists of potential participants to the coordinator. The coordinator will pull those employees' Official Personnel Folders and check the educational attainment level as recorded in the SF 171. Note will be made of those employees who have not graduated from high

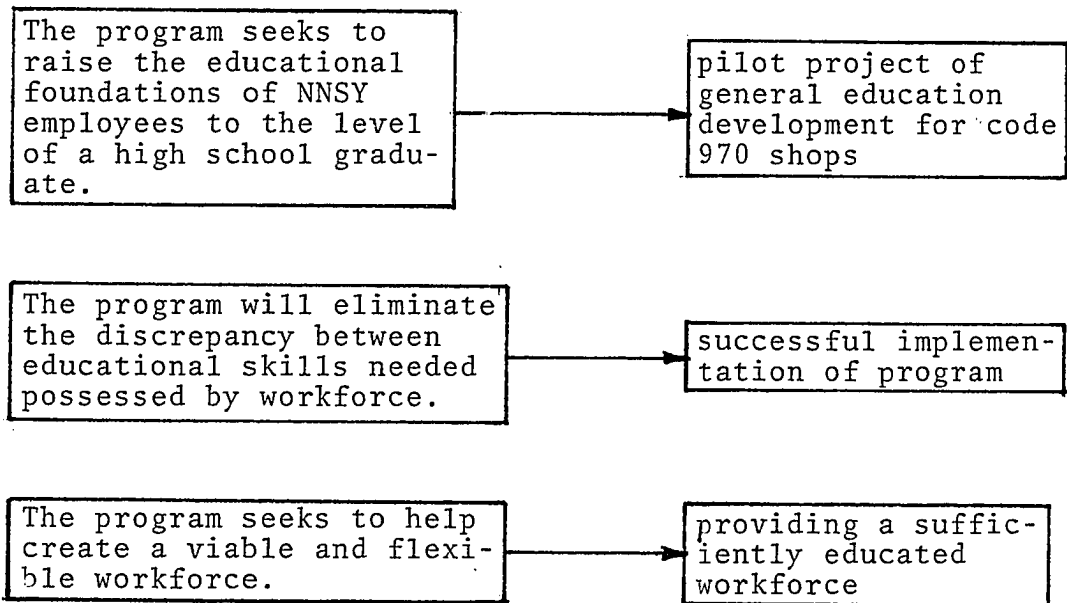


Fig. 5-1. Developmental program objectives

school.

Recruitment of participants follows identification. This program is not mandatory. A supervisor cannot demand that an employee participate in the course or have his pay docked. Therefore, recruitment must be through positive persuasion. The coordinator will visit during training sessions to explain the program to the employees. The group administrative officer will advise all supervisors to speak positively of the program and to encourage enrollment. Those employees who were targeted by training instructors would be spoken to, but without drawing special attention to them in front of the other employees. Posters will be posted explaining the possible positive benefits. The coordinator will work with Tidewater Community College during registration to expedite the paperwork as much as possible. Registration for the development courses will be held during the lunch hour and immediately following the day shift in the buildings where the particular shops are housed. All of the forms necessary to sign up for the course will be available so paperwork can be completed in one trip. This program is fully backed by the shipyard, therefore, the employee will not have to pay for the course at registration.

A second task will be to develop specific vocabulary studies based on the needs of the specific shops. For example, employees of the paint shop, shop 71, need to know specific terminology concerning paints and preparing

surfaces to paint.

A third task is to coordinate Tidewater Community College courses with shipyard needs. The shipyard appointed coordinator will have determined, as noted earlier, some specific shop needs. The coordinator will work closely with the instructors from Tidewater Community College who will be assigned to the developmental courses.

An important consideration is to justify the expense of this general educational developmental program to shipyard management. Justification will be based on the results of both process and impact evaluation. Process evaluation will include measures of involvement of specialized vocabularies in the course material. Each participant will have at least one-half of his practice work based on identified shipyard needs. In addition, after one ten-week session, at least two-thirds of the participants will have improved their reading levels by one year. Improvement will be determined by comparison of pre- and post-session administration of the Slossen Oral Reading Test and an informal reading inventory for adults.

Impact evaluation will be based on comparison of failure rate in training session by employees who have participated in the developmental program before taking the session and after taking the session. In addition, a comparison will be made of the number of reports to supervisors of confusions concerning process instructions and directives before and after the developmental course. The

evaluation model of the program will be more fully developed in another section.

Figure 5-2 is a representation of the tasks of the proposed program.

Recruitment of Participants

This pilot project will focus on those employees of code 970 whose educational skills are at a level below that needed for successful and efficient job completion. Norfolk Naval Shipyard's record office does not possess any listings of workers by educational achievement level. There is a list of all personnel in a particular shop. In order to find out the employee's educational background, each official personnel folder would have to be pulled.

An easier, but perhaps not as accurate method of identifying employees who would need general educational development courses would be to ask the training instructors (TIs). The TIs come in contact with all the personnel of their shop, usually on a regular basis. The TI knows whose educational skills inhibit successful training. The TIs, therefore, would submit to the appointed coordinator a list of employees who were potential participants. The training instructors would also attempt to speak to those individuals who might benefit from the program. The coordinator would attempt to contact those individuals suggested by the TIs in order to explain the program. The coordinator would help the targeted participants to fill out Tidewater

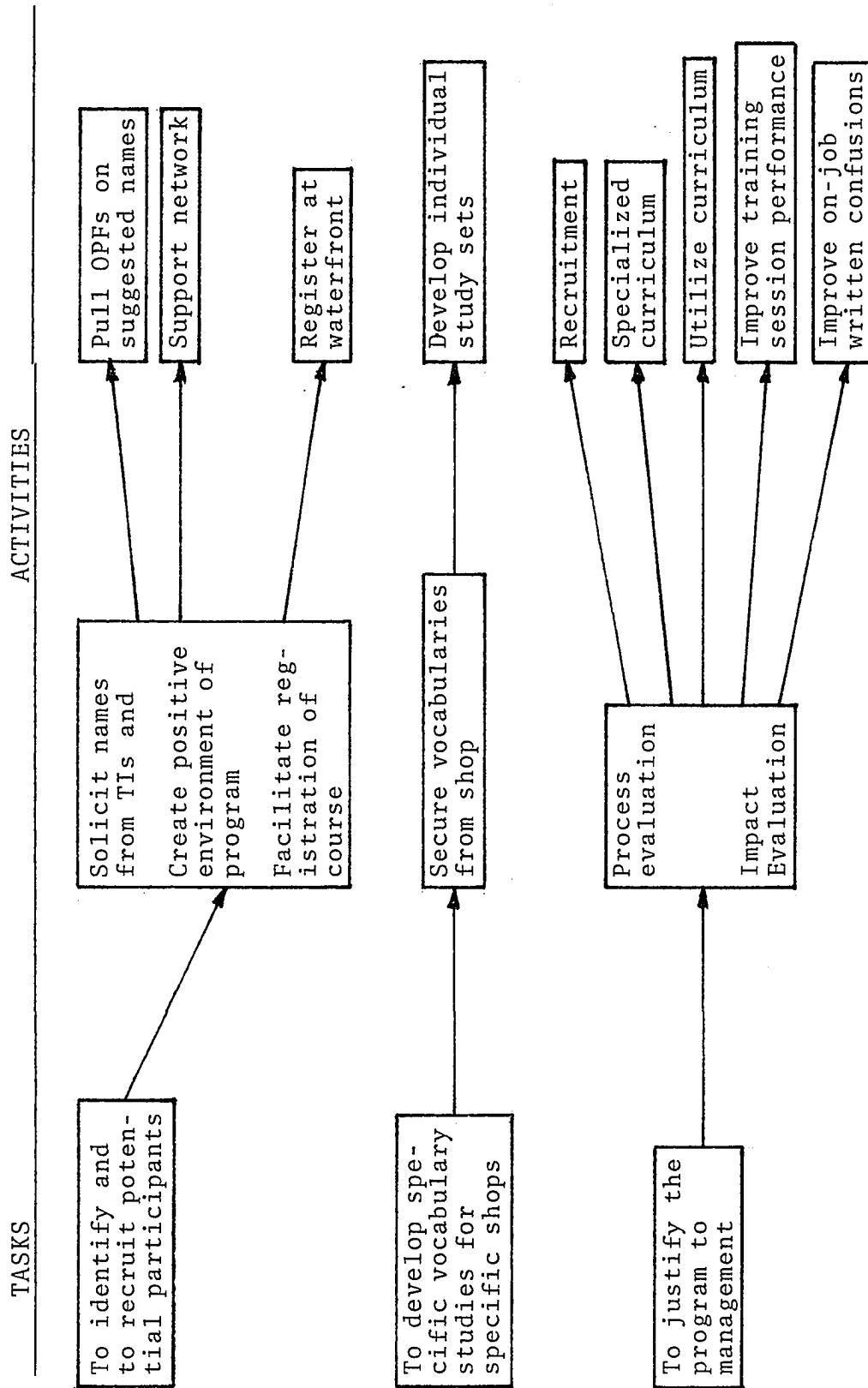


Fig. 5-2. Developmental Program Tasks and Activities

Community College registration forms.

Identification and recruitment of potential participants would also be done by the first line supervisors in these shops. These supervisors come in contact with the waterfront workers and usually are cognizant of employees who cannot handle written instructions. The supervisor would not be able, nor would he be expected, to determine the educational level at which an employee is functioning. Nevertheless, the supervisor can offer positive encouragement to those employees who the supervisor feels need to enroll in the program.

Development of the Curriculum

The coordinator will solicit lists of key vocabulary from each shop. The supervisory training instructors usually have some references to important vocabulary used for the specific shop function. For example, the employees of shop 71, the paint shop, need to know all the terms concerning paint and painting surfaces that are used in training sessions and on the job. The same is true for shop 64, woodworking which includes boatbuilders and shipwrights. Shop 99, temporary services shop, embraces a wide variety of tasks from unskilled to highly skilled. Many of the tasks are the same as in other shops, however, shop 99 is responsible for the task while a ship is being maintained in dock. One task is the setting up of temporary electrical connections. This job requires an electrician who would

need the same skills and vocabulary as those electricians in shop 51, the electric shop. In order to compile a complete list of educational needs from shop 99, it may be necessary for the coordinator to solicit information from shops outside of those chosen for the pilot project.

Evaluation of the Program

The evaluation of a project is an important component. Without some evaluation, the program becomes more of an exercise and less of a productive affair. Evaluation of this particular project is very important. Traditionally, employee development has been considered the aspect of human resource development which is least defensible in terms of money and personnel expended.¹ It has been difficult to justify the expense of development programs because of the intangible outcomes often associated with development programs. Furthermore, Norfolk Naval Shipyard has stated in its mission statement that employee development is not within its purview. However, as discussed earlier, development has become entangled with training. Without the development courses providing educational foundations, training is ineffective and job performance can be inefficient. Therefore, educational development is a necessary pre-requisite for training. It is also an important factor in creating the desired viable and flexible workforce which is important

¹Leonard Nadler, Developing Human Resources (Houston: Gulf Publishing Co., 1970), p. 89.

for today's organizations.

Two kinds of evaluations will be used with this program. Process evaluation is concerned with the on-going performance of a program. Performance monitoring assures that the program is being conducted as envisioned. Performance monitoring can also reveal that the program is not advancing as intended, providing the opportunity to bring the program back into line or to change the original emphasis based on the on-going data from the process evaluation.

The performance monitoring of the program of general educational development at Norfolk Naval Shipyard will focus on three points: 1) recruitment, 2) development of specialized curriculum and 3) utilization of the specialized curriculum. The base criteria for evaluation the recruitment process will be the number of employees who ultimately enroll voluntarily in the program. Additional measures are the number of TIs and supervisors who submit names of potential participants. There is no way of knowing how many of the employees of shops 06, 64, 71, 72 and 99 have not completed high school. Based on the educational attainment survey described in Chapter Three, at least one-third of the workers have not graduated from high school. Recruitment will be considered successful if fifty percent of that one-third can be identified and if ten percent of the potential one-third enroll in the pilot course.

The second focus for performance monitoring involves another responsibility for the coordinator. The development

of the specialized curriculum is an important aspect of this program. This ties the educational development course to the shipyard. The course then is addressing specific shipyard needs. Vocabulary study sets shall be developed on each shop and ready for the first session of the course.

The third focus of the performance monitoring will involve the utilization of the specialized curriculum. Unless the specialized vocabulary is incorporated into the course, its development is meaningless. The instructor from Tidewater Community College who is teaching the pilot development course will be asked to use the provided vocabulary study sets as a minimum of one-half of the example sets used during the ten-week course. If the teaching objective is the learning of prefixes and suffixes, then shipyard vocabulary needs can be used as the study examples.

Evaluation of a program is concerned with the participants in the program as well as the mechanics of the program itself. It is an important aspect of the evaluation of this program to be able to attribute changes in educational skills to the course of study. A pretest/post-test of the target population and of a selected control group will be the experimental design. The course participants will be considered the target group. As an initial part of the course, each participant will be tested to establish individual reading level. At the end of the ten-week session, the participants will be tested again to measure any gain in reading ability. A control group will come from the

pool of those employees who were suggested by the training instructors and the supervisors for inclusion in the program, but who did not participate. A group equal in size to the enrollment of the development class will be randomly chosen from the list of potential participants. The coordinator will contact these employees and will, prior to the start of the development class, administer the same test that will be given to class participants at the first session. After the ten weeks, the coordinator will again contact the control group and administer the post-test. A t-test for significance will be conducted.

This design is an experimental design according to Campbell and Stanley and controls for possible threats to validity. The target group, the group which is enrolled in the program is, however, not a true random group. This group selected itself. The fact that these individuals possessed the initiative to sign up for the class as opposed to the other possible participants who did not take the step of becoming involved may be indicative of a difference between the target group and the control group. However, this difference should not invalidate any results.

Impact evaluation is perhaps the most powerful measure of the value of a program. Impact evaluation measures the "so what" of a program. Process evaluation can indicate whether the program is advancing according to design; impact evaluation indicates whether the design means anything. Impact evaluation of this program of educational

Group	Pre-		Post-
Experimental QR	0_1	X	0_2
Control R	0_3		0_4

Where 0 is testing

X is treatment

R is random

Fig. 5-3. Evaluation experimental design

development will include measures of changes in the training sphere and on the job. A comparison will be made of the success of training sessions after the program for those in the test group and in the control group. Training session tests will be compiled for these two groups. If more of the targeted employees are passing training session tests after participating in the educational development course, then the program is accomplishing one of its goals-- that of eliminating the discrepancy between the educational skills needed and the educational skills possessed by the wage-grade workforce at Norfolk Naval Shipyard. The other sphere where this program is expecting to make an impact is on the job. One situation which led to the investigation of the effects and remediation of an under-educated workforce in the first place was misunderstood directives and process instructions. This evaluation will compare incidences of confusions reported to supervisors concerning written instructions or certifications.

Implementation Team

Need for a Team

One of the means to increase the probability of successful implementation of a program is to include on an implementation team those who have responsibilities to carry out the program. Distortion of programs is more likely to occur when communication channels break down between those who plan the program and those who implement the

program.¹ Those who have the responsibility to carry out a program may subconsciously change the purpose or thrust of the program simply because they do not know the intent of the program designer.

Several years ago, the shipyard instituted a program with the Portsmouth Public Schools to offer G.E.D. preparatory classes at the shipyard half on-the-clock. In this arrangement the employees were allowed to attend class half on their own time and half during working hours. The supervisory training instructors were supposed to be the conduits of information from the program manager to the waterfront worker. The program manager, however, did not contact the supervisory training instructors for ideas prior to the start-up of the program, nor did the program manager provide them with any background or explanatory information. The STIs simply received a memorandum that they were to recruit participants for the course. The STIs resented being told to do something and not being told anything about it.² As a result, the STIs were ineffective in guiding employees who needed the program into taking it. This example illustrates the importance of conveying information up and down the lines of communication. Those who will be

¹Jeffrey L. Pressman and Aaron Wildavsky, Implementation (Berkeley, California: University of California Press, 1979), p. 107.

²Interview with Steven T. Falls, Group Administrative Officer, Group 930, Norfolk Naval Shipyard, Portsmouth, Virginia, 19 February 1981.

expected to help implement the program, therefore, should be included in the organization.

Team Membership

The implementation for the pilot project will have five members. These members will represent the three organizational divisions which must work together in order to accomplish the program goals. The program cuts across divisions and the implementation team needs to represent these different interests.

This program is originating out of code 180, Employee Development office. The ultimate responsibility for the program lies with this office. Code 180 is responsible for administering all training and development at the shipyard. The head of code 180, or the employee development specialist who is assigned to this program, will represent one interest on the team.

A coordinator will be hired by code 180 from outside the shipyard to handle the specifics of recruitment, development of the specialized curriculum and to coordinate the evaluation. This individual will provide the implementation team with expertise in the field of reading and curriculum development.

Tidewater Community College is another organizational entity which must be coordinated with shipyard needs. The program of general development is based on courses already being offered at Tidewater Community College. The first

development course, the one to be used in the pilot project, will be developmental reading. It is, therefore, important to solicit the support of the head of the English department. The head of the English department has the authority to assign or not to assign reading faculty to the shipyard in a given semester. This member of the implementation team will be able to explain how T.C.C. policy can be coordinated with program needs.

Tidewater Community College interests will also be served on the implementation team by the instructor who will actually teach the developmental reading course. This individual must believe in the philosophy of the program or the program will be subverted. Thus, it is imperative to include the instructor on the implementation team.

The fifth team member represents the organizational division where the program will take place. Code 180 representative will administrate the program, T.C.C. representative will teach the program, but the heart of the program is the employees who will participate. Without participants, the program is an empty exercise. The pilot project is focusing on one part of the production code, the five shops in code 970: shops 06, 64, 71, 72 and 99. The participants for the program will come from these shops. It is important that the management of code 970 is supportive of the program. Successful recruitment of participants depends on input from training instructors and supervisors. The information for the specialized vocabulary study will

come from the supervisory training instructors for the five shops. Evaluation cannot be conducted without these officials' aid. The best representative from code 970 for the implementation team is the administrative officer. The administrative officer has the ability to set the tone which the code will have towards the program. If the administrative officer speaks positively and knowledgeably about the program, then there is greater probability that the supervisors will impart the same attitude to the workers. Ultimately, it is the workers who must feel positively toward the possibilities of the program.

Team Member Responsibilities

It is the responsibility of the administrator from code 180 to chair the implementation team. As chair, he has the responsibility to set up a schedule of meetings for the team. The code 180 representative will set the agenda for the meetings based on input from the program coordinator. The code 180 administrator is also responsible for any reports concerning the program which are to be submitted to higher authorities in the shipyard. Specifically, the final report on the pilot project containing the evaluation component will be submitted to the admiral in charge of the shipyard six weeks after the end of the ten-week developmental course. These reports will go out under the code 180 administrator's name. In addition, code 180 will represent the program at any other meetings.

The program coordinator has several areas of responsibility. The coordinator is responsible for soliciting lists of possible participants from the training instructors and the supervisors. The coordinator will cull the lists by checking the official personnel folders in the records office and ascertaining the educational attainment level of those employees recommended. The coordinator will then present the administrative officer of code 970 with the list of those employees who have less than a high school education for possible inclusion in the program.

The coordinator is responsible for obtaining information concerning the specialized vocabularies from each of the shops and compiling study sets using this vocabulary for the individual shops.

The coordinator is responsible for assisting Tidewater Community College personnel during registration. Registration will be moved from the usual place in Building 400. Building 400 is removed from the waterfront and beyond the industrial sector. Instead, employees will register for the pilot project at the waterfront in Building 298 where four of the five shops chosen for inclusion in the pilot project have their training offices. This move attempts to address one of the barriers to implementation as discussed in Chapter Four. A characteristic of the targeted population is a lack of initiative to become involved in an academic situation. If it is less difficult to register, then it is likely that more of those who might benefit from

the developmental course will register.

The coordinator is responsible for collaborating with the instructor from Tidewater Community College in the presentation of the specialized vocabulary during class instruction.

The coordinator is responsible for overseeing the evaluation of the program. The coordinator will submit to the code 180 administrator the verification of events which correspond to the process evaluation as described in the section on evaluation earlier. The coordinator will conduct the pre- and post-test of the control group and will assist the instructor in administering the pre- and post-test to the test group. Finally, the coordinator will collect the data necessary for impact evaluation as outlined in the section on impact evaluation.

The Tidewater Community College department chairman will be the link between the shipyard and the college. The department chairman will be responsible for conveying any information or reports deemed necessary to the college administration. The department chairman is also responsible for appointing the instructor for the pilot course of developmental reading.

The Tidewater Community College instructor is responsible for teaching the class. The instructor is expected to incorporate into this class the ideas of andragogy as discussed in Chapter Four. It is the responsibility for the instructor to use the individualized vocabulary study sets

whenever possible. The instructor is to call on the coordinator for support when needed.

The code 970 administrative officer is the linkage from the program to the shop organization. The administrative officer will explain the goals and procedures of the program to the supervisors at the appropriate weekly staff meeting. The administrative officer will also be the facilitator for the coordinator as the coordinator carried out the details of the program.

Responsibilities and linkages of the five members of the implementation team are represented in Figure 5.04.

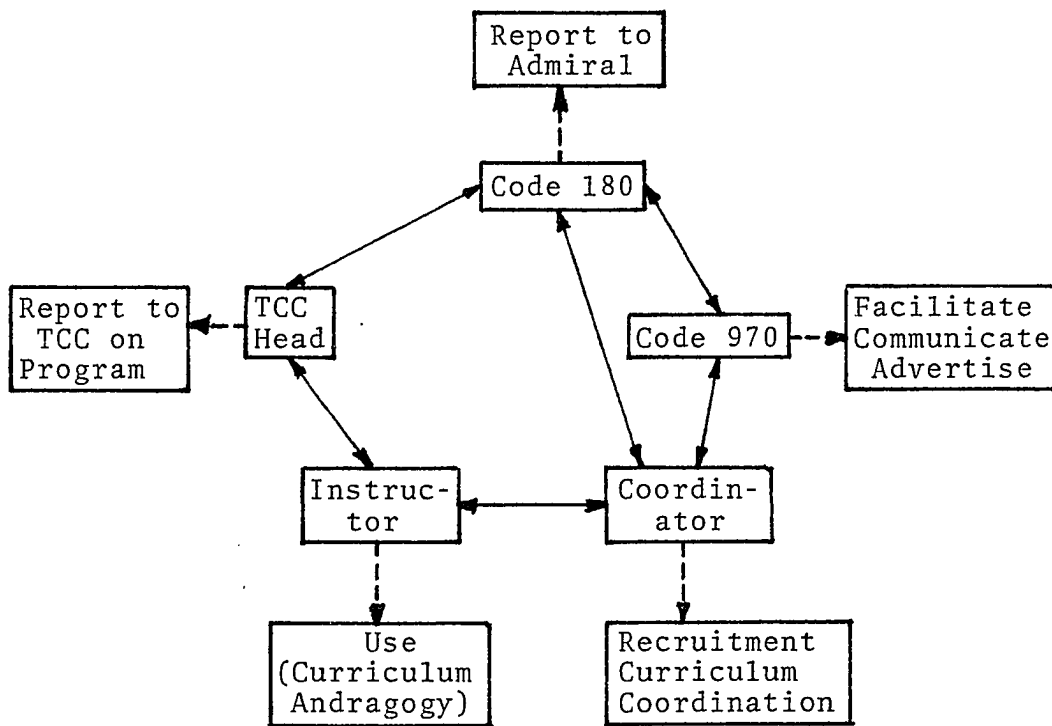


Fig. 5-4. Implementation Team Responsibilities and Linkages

The dotted lines represent some of the responsibilities for each of the five members. The solid lines indicate lines of communication and interaction. The code 180 administrator would work with and communicate mainly with three of the members: the T.C.C. department chairman, the code 970 group administrative officer and the coordinator. In contrast, the T.C.C. department chairman would deal primarily with code 180 and with the T.C.C. instructor. The code 970 administrative officer and the T.C.C. department head would most likely not have crossing work lines.

Budget

Direct Costs

The pilot project for improving developmental skills only incurs two direct expenditures. These expenses represent the cash outlay necessary for the coordinator and for the Tidewater Community College course fee. These costs are specific to this project and are consumed by the project.

There is no extra employee in code 180, Employee Development, who has the time to assume the full responsibility for this job. This position can be filled, however, by a specialist in reading from outside the shipyard. The shipyard can use a consultant form to hire someone for this temporary, part-time position. When hiring a consultant, the shipyard is not committed to providing benefits. Therefore, the total cost for hiring a consultant is the salary. The coordinator for this pilot project will be expected to

spend approximately 20 half-days at the shipyard in order to complete the responsibilities for this position. The salary is targeted at \$800.00.

The second cash outlay in the budget is the Tidewater Community College fee for each participant in the course. Currently, the fee is \$32 per participant. If 15 employees are the number of participants in the pilot project, then the shipyard will incur an expense of \$480.00.

These two expenses total an outlay of \$1,280 for one session of a developmental course for 15 employees.

Costs Budgeted Elsewhere

The budget for the pilot project of educational development involves a second category of expenses. Several expenses of the project are covered in other budgets within the shipyard. These costs are incurred by the project, but are not specifically assigned to the project budget. Overhead costs for the physical facilities is one example of a cost which is covered through other budgets. The developmental course will be held in one of the training rooms in Building 298. The costs for lighting and heating/cooling these rooms will not be charged to the pilot project. The same is true for maintenance and upkeep. Rather, these costs will be incorporated into the greater budget for the entire shipyard.

Administrative costs are another area of the pilot project's budget which is incorporated into larger budgets. This program calls for involvement from the head of code

180, from the group administrative officers of code 970 and from the supervisory training instructors of the five shops in code 970. None of these personnel will be asked to spend large amounts of time on this project. Nevertheless, these administrators will have to add this project to their agendas. Even though these employees will contribute to the program, the program will not incur personnel expenditures arising from these employees. Salary and benefit expenses for these administrators show in the budgets of their separate codes.

Similarly the chairman of the English department at Tidewater Community College will contribute some time and expertise to this project. However, this position is supported financially by Tidewater Community College. The instructor of the course is on the payroll of T.C.C., not the shipyard. Neither this project in specific, nor the shipyard in general is responsible for the instructor's salary or fringe benefits.

Work Plan for Program Implementation

Equivalency Model

This proposal depends on a multiplicity of actors. Shipyard administration is represented by the head of code 180, the group administrative officer of code 970, the consultant coordinator and the supervisory training instructors. Tidewater Community College contributes two actors, the chairman of the English department and the instructor

for the course. Ultimately, the most important group of actors is the waterfront employees who will participate in the program. Program success is dependent on the interrelationships of these actors. All will benefit from the program to improve developmental skills of employees.

The activities of the program are represented in figure 5-5. These activities are also categorized. In the figure the triangular shape is used to represent those activities for which the shipyard administration is responsible. The rectangular shape represents those activities for which Tidewater College is responsible. The oval shapes represent those points in the program where evaluation will take place.

The flow begins with shipyard commitment to the objectives of the project and the acceptance of the program proposal by code 180. The implementation team is formed. Participants are solicited from among the waterfront employees of shops 06, 64, 71, 72 and 99. Special study sets are developed by the coordinator. Tidewater Community College conducts registration prior to the course. The pre-test is administered to both the test group and the control at the beginning of the ten-week session. Post-test evaluation is conducted on both the test group and the control group immediately following the developmental course. Further evaluation is conducted to determine the impact of the pilot project. A report is submitted to the shipyard director based on information from the evaluation of the

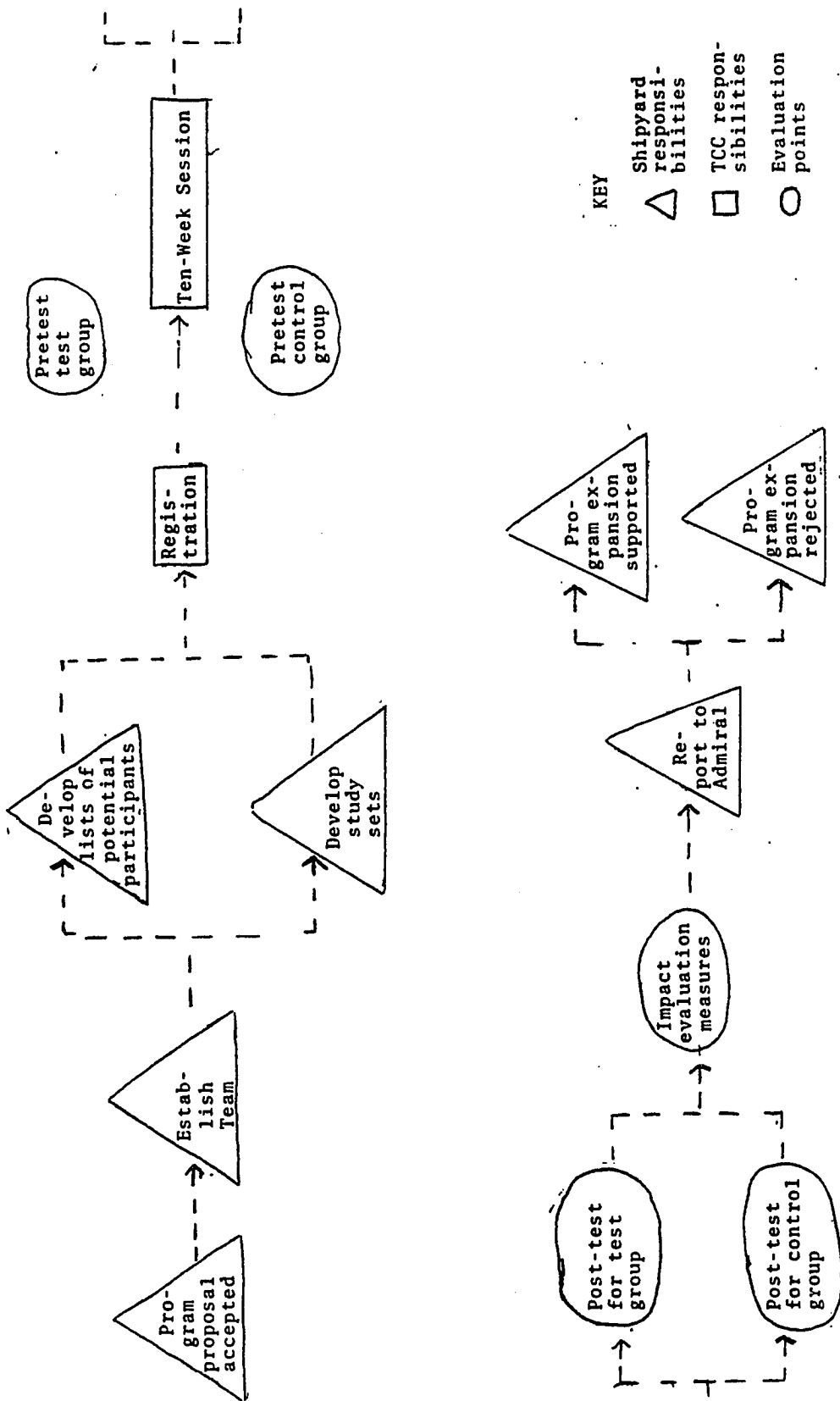


Fig. 5-5. Pilot Project Equivalency Model

project.

Time Model

The timing of the activities of the program in the form of a time chart is represented in Figure 5-6. The first actions take place five weeks before the course is scheduled to begin. In the fifth and fourth weeks before the course, the lists of potential participants are compiled. The study sets are also developed. In addition, the group administrative officer of code 970 informs the supervisors and the supervisory training instructors of this section about this program and encourages subsequent support. During the third week before the course, information concerning the program is dispensed from the supervisors to the employees of shops 06, 64, 71, 72 and 99. Other information networks are tapped. An article appears in the shipyard newspaper. Posters are displayed in the shops and in the training rooms. Registration takes place in the two weeks before the course begins. The pretests are given to both test group and control group as described in the previous section on program evaluation. The study sets are used throughout the ten-week program. Post-tests are given immediately following the course. Impact evaluation measures are taken four weeks after the end of the course. A report to the admiral is submitted six weeks after the end of the course. This report goes out under the name of the head of code 180.

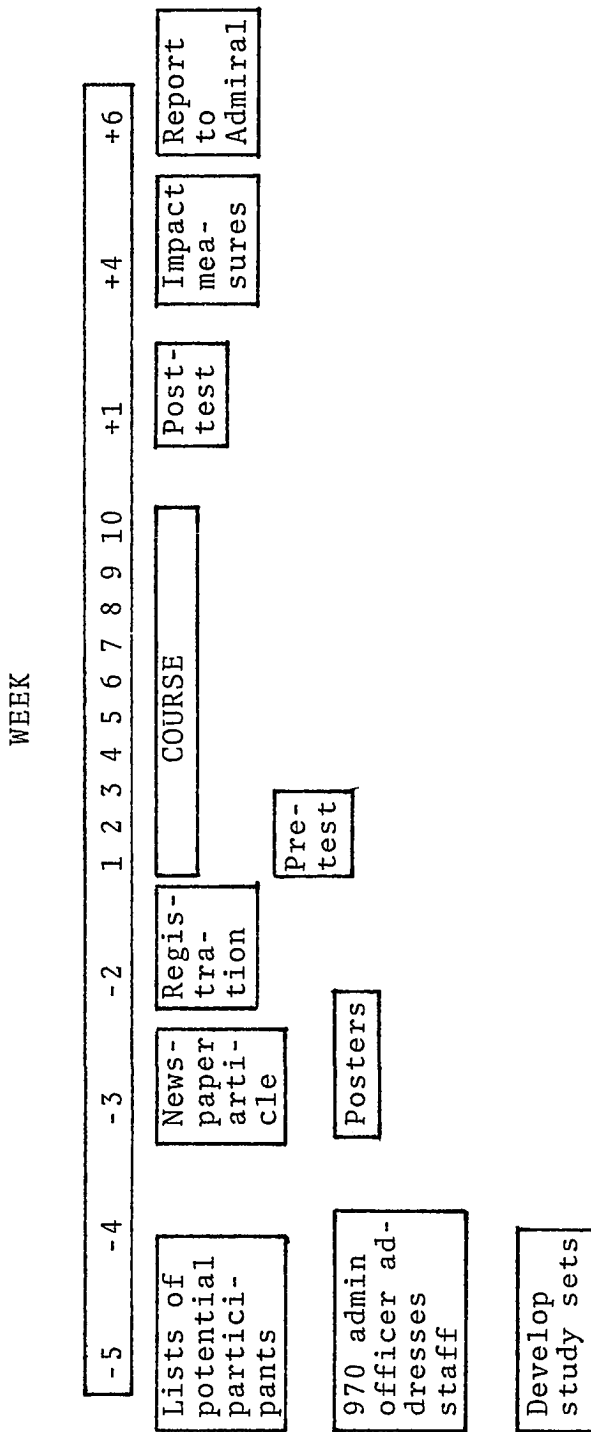


Fig. 5-6. Time Chart

Conclusions

If, according to the results of the evaluation, it does not appear that the developmental course is having any positive impact on specific shipyard needs, then it may be the decision of shipyard administration to abandon this project aimed at improving employees' basic educational skills. The final decision rests with the admiral in charge of the shipyard.

If, however, improvement is seen in the chosen criteria discussed earlier, then the pilot project will be expanded to all wage-grade employees and not limited to certain shops in the industrial area. Additional developmental courses would subsequently be offered. Possible choices were described in Chapter Four including courses to improve wage-grade employee foundations in reading, writing and arithmetic. This final decision also rests with the admiral.

The ultimate goal of this program of employee educational development is to produce a workforce whose skills are sufficient for today's needs and flexible enough for tomorrow's demands.

CHAPTER SIX

MODEL GENERALIZATIONS

The employee is a valuable asset in today's business and industrial organizations. The employee also represents a major financial investment by an organization. Business and industry are beginning to view employees as an important factor in the profitability formula along with technology and equipment.

In today's post-industrial revolution society, technology has surged ahead. Not only are there new approaches to industrial procedures, there are whole new industries which have sprung up in this worker's generation. Society at large as well as the work environment is becoming more sophisticated. Educational needs are also rising and becoming more sophisticated. These increased educational demands are occurring both in society at large and in business and industry. Employees today need to have educational foundations which are commensurate with job demands.

Many employees today, however, may not have the educational skills necessary. The census bureau and the International Reading Association have classified any adult with less than an eighth grade education as a "functional illiterate." This label indicates that modern American

society requires educational skills higher than those at an eighth grade level. Some 39 million American adults have not completed eighth grade. Therefore, it is probable that significant numbers of employees do not possess adequate educational skills. This lack may result in inefficiency or ineffectiveness by the workforce. It is also possible that unsafe conditions may arise from situations where employees are not able to follow correct procedures because they are, for example, unable to read the instructions.

It is to the benefit of an organization, therefore, to be cognizant of the educational skills level needed by various segments of their workforce. Of course, unskilled laborers would not be expected to have the same educational skills as upper level management. Nevertheless, there is often a basic requirement level which is common to all employees. This project indicates that an organization does have certain educational expectations for the workforce as a whole. An organization, however, may not know at what level their employees are functioning even though the expectations are specific.

This project can be a model for addressing the overall issue of educating employees. The model has three phases. The first phase asks the question: What are the educational needs of a particular segment of a workforce? The second phase asks: At what level are these targeted employees now functioning? The third phase asks: What can be done to bridge the gap between estimated need and reality?

The particular details of the approaches to address these questions may vary from organization to organization. Nevertheless, the basic research methods are more standard. A needs analysis indicates a response to the first question. A study of employee records may provide the information to answer the second question. Finally, alternative programs can be proposed from which one would be developed for implementation. These three aspects of the model are basic to human resource development. The model, therefore, recognizes the importance of HRD to business and industry.

The wage-grade segment of a shipyard's workforce is the targeted population for this specific program. The wage-grade employee is traditionally a "blue-collar" employee even though wage-grade tasks vary from unskilled to highly skilled. This model applies to any industry with a blue-collar population. For example, the automotive, steel and textile industries may find that the questions raised for Norfolk Naval Shipyard apply to their situations. These industries, as with the naval shipyards, are facing changing technology with an under-educated workforce. The functionally illiterate adult can be found throughout the United States. The benefits to the organization from a program of employee development could include improved efficiency, effectiveness, quality control and safety.

The model suggested by this project is not necessarily limited to industries with a large blue-collar component. Indeed, the model also appears applicable for any business

or industry at any level of employment from shop boy to executive where change occurs. Whenever change occurs, the employee is at that point under-educated until he has had a chance to fill in the gaps in his knowledge or understanding. A problem for the organization exists when the employee cannot meet the needed changes from his own resources and if the company cannot help the employee cope with change. This model attempts to help organizations to identify those areas where problems of this nature might arise.

Furthermore, this model applies to human resource development whether or not an organization is undergoing change. Individual development can better prepare an individual to cope with his total environment. A capable employee is a benefit to his employer and to society at large.

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APPENDIX A

SUMMARY OF INTERVIEWS

The Group of Administrative Officer and the Supervisory Training Instructors for the Production Department, Code 300, were chosen as the best group of managers and supervisors to provide information concerning the educational needs for the wage-grade segment of the workforce at Norfolk Naval Shipyard. In addition, these personnel might be cognizant of the educational achievement level of the targeted employees.

The Production Department, Code 300, is the largest of the departments at Norfolk Naval Shipyard. It is organized into trade and craft shops. The shops are grouped by similarity of work. The Production Department is responsible for manufacturing and installing parts and equipment for ships, altering and converting ship's equipment, and repairing damaged or malfunctioning ship's structures and systems. The following is an outline of the divisions within this code.

Structural Group (Code 920)

Shop 11 (Shipfitter Shop) fabricates, installs, alters, and repairs ship's structural steel components; performs forging, drilling, chipping, riveting, and sawing steel

plates.

Shop 17 (Sheetmetal Shop) manufactures, assembles, erects, and repairs sheetmetal products and ventilation and air-conditioning systems.

Shop 41 (Boiler Shop) fabricates, installs, repairs, and tests boilers and boiler components.

Shop 26 (Welding Shop) performs all types of welding, flame spraying and flame-cutting operations.

Mechanical Group (Code 930)

Shop 31 (Inside Machine Shop) performs machine work associated with the overhaul and repair of optical and teletype equipment, hydraulic motors and valves, deck machinery, turbines, and diesel engines. This shop also employs patternmakers and operates a foundry.

Shop 38 (Outside or Marine Machine Shop) overhauls repairs, and aligns shipboard ordinance equipment, main propulsion, and auxillary machinery.

Shop 56 (Pipefitter Shop) repairs, installs and tests shipboard piping, refrigeration, and air-conditioning systems and components; and installs pipecovering and insulation.

Electrical/Electronics Group (Code 950)

Shop 51 (Electrical Shop) repairs, installs, modifies, tests and aligns motors, generators, regulators, instruments, test equipment, rubbermolded and vulcanized components, gyro compasses and associated equipment.

Shop 67 (Electronics Shop) repairs, overhauls, installs, calibrates and tests electronics, fire control, sonar, radar, radio, crypto, secure voice, telemetry, torpedo, computer and antenna systems.

Service Group (Code 970)

Shop 06 (Central Tool Shop) installs, inspects and adjusts machine tools and shop equipment; manufactures dies, gages, jigs, and fixtures; calibrates precision tools; and operates tool supply room.

Shop 64 (Woodworking Shop) builds and repair boats; fabricates wood products; installs staging and wood decks; lays out and positions keel and bilge blocks for drydock operations; manufactures and repairs fiberglass; installs insulated deck coverings.

Shop 71 (Paint Shop) provides painting and sandblasting service, installs deck coverings, applies coating on subsafe parts and provides sign painting services.

Shop 72 (Riggers Shop) manufactures and installs shipboard rigging; provides tank cleaning and laborer services; manufactures canvas products; upholsters furniture; tests and repairs inflatable lifeboats; provides diving, handling and moving services.

Shop 99 (Temporary Service) installs and maintains temporary electrical, mechanical, ventilation, steam, compressed air and water-piping systems for vessels berthed in the shipyard.

Interviews were conducted with the following group of managers and supervisory training instructors: Code 300 Assistant Director, Group Administrative Officers of Codes 920, 930 and 970 and of Public Works, and supervisory training instructors of Shops 11, 17, 41, 26, 31, 38, 56, 06, 64, 71, 72, and 99.

The interviews had multiple goals. Information was both solicited and imparted. In addition, a positive support system was cultivated for future programs of employee development. The interviews were structured and proceeded along these lines:

- introduction of the interviewer, explanation of position and role in shipyard for human resource development
- explanation of adult education terminology and national needs for adult education
- solicitation of information from the specific codes of 1) shop duties, 2) job needs and 3) description of shop personnel
- rationale for Code 180 (Employee Development) looking into the area of adult education and human resource development
- quantification of any discrepancy between educational needs and educational achievement of employees of the particular shop
- gathering of anecdotal information if other data is not available.

Summaries

Assistant Director of Code 300

Mr. Caravana expressed the opinion that the training which needs to be done in the production code is sometimes

impossible to accomplish because of the worker's lack of basic skills in reading and arithmetic. Nevertheless, Mr. Caravana did not feel that it was within the mission of the shipyard, nor was it feasible because of available resources to inculcate remedial educational instruction into the training program.

Mr. Caravana did not think that the shipyard workers for the majority felt the need for any developmental educational courses in order to fulfill a personal lack. Instead, he stressed that these employees must be able to tie the educational experience to the possibility of increased dollars per hour on the job. If a program were offered off-the-clock, Mr. Caravana felt that only a small segment of the worker population would take advantage of such a program.

Mr. Caravana, however, did not have any data to support his feelings. He could not document his opinion that a discrepancy existed between employee educational needs and the actuality of employee educational skills.

Administrative Officer of Code 920

Mr. Mooney was a former supervisory training instructor. He expressed an opinion both as a former STI and as an administrative officer that a problem did exist. He definitely felt that a gap existed between need and actuality. However, he could not present any data on the educational needs for his group of the production code.

Mr. Mooney told anecdotes of the employee who was able to accomplish his tasks, but when involved in a training session would turn in blank test papers. In addition, Mr. Mooney mentioned that he had heard of employees who would have others fill out merit application forms for them because they could not read the questions.

Mr. Mooney felt that there would be definite problems surrounding developmental programs for the wage-grade employees. One problem would be determining what to offer. Another problem would be getting the employees to participate. Mr. Mooney agreed to support any developmental program which could be devised.

Supervisory Training Instructor of Shop 11

Mr. Venning, the STI of Shop 11, was the third interview in a row for the interviewer. Mr. Venning had been in the office of Mr. Mooney during part of the preceding interview. The interviewer made the assumption that Mr. Venning understood the background of the proposed project as he had heard it already. This assumption, however, was false. Mr. Venning would acknowledge the need in his shop for developmental programs and then would also state that his shop did not have any problems.

Although Mr. Venning would not be a liability to any future developmental programs, it was not felt that he would be aggressively positive.

Supervisory Training Instructor of Shop 17

Ms. Tina Clifton stated that in her shop, in her estimation, many of the wage-grade employees would benefit from improved skills in reading, writing and arithmetic. Ms. Clifton felt that sometimes the lack of basic educational skills hampered training sessions. However, Ms. Clifton did not have specific data other than references to failures during training sessions.

Supervisory Training Instructor of Shop 41

The Boiler Shop contains some positions of lower wage-grade ratings. Mr. Issac indicated that he felt that some of the employees in the lower ratings lacked the educational foundations necessary for the demands of the training sessions. As with the other STIs, however, he had no concrete data other than the numbers of failures during testing.

Mr. Issac was very willing to distribute information to those workers with whom he came in contact concerning any forthcoming programs of human resource development.

Supervisory Training Instructor of Shop 26

Mr. Lisky was aware of possible discrepancies between the educational skills of the employees in the welding shop and educational demands of training sessions and of the demands of written instructions. Mr. Lisky told of instances of employees who turned in blank test papers and of employees who appeared to be successful on the job but who

were unsuccessful in the classroom during training.

Group Administrative Officer of Code 930

As a former STI in Shop 56, Mr. Falls had many stories illustrating a need for developmental educational programs based on his previous experiences. One story was of employees sleeping during test periods and turning in blank papers. One worker stated flatly to Mr. Falls that he, the employee, "didn't write." The employee did not say that he could not, but that he did not write-not even in front of his wife.

In addition, Mr. Falls was cognizant of possible barriers to a developmental program. He remembered the previous attempt at a General Educational Development preparatory program. He felt that any future attempts would have to overcome the negative residue from the earlier program. He felt that that earlier program was unproductive. Mr. Falls mentioned his appreciation of being included in the planning for this program.

Supervisory Training Instructor of Shop 31

Mr. Weatherington shared the same concerns as his group administrative officer. He stated strongly that a lack of basic educational skills interfered with his training sessions. However, he was unable to document or to quantify his opinion. He expressed support for any program of educational development.

Supervisory Training Instructor of Shop 38

Mr. Larcombe definitely felt that the general educational level of the employees in his shop gets in the way of the training to be conducted. Once again, he had no hard data to support his feeling. Mr. Larcombe recognized the problems associated with possible alternatives to alleviate this need. Mr. Larcombe suggested himself that the STIs be used to funnel information to the employees and to collect names of those interested to be passed on to Code 180. He felt that this was preferable to having the employees contact Code 180 directly.

Supervisory Training Instructor of Shop 56

Shop 56 is the Pipefitter's shop. This is a relatively large shop with some 800 employees. Mr. Byrne recognized that there definitely was a problem concerning the academic skill level of the employees in this shop which impacted on the training which he was attempting to offer. It was in this shop that Nav C required the administration of a precision measurements test several years ago. Nav C was expecting to have perhaps a 50 percent failure rate. Instead, there was a 97 percent failure rate. Several anecdotes which this STI related to the interviewer included the employee who performs satisfactorily on the job, but who turns in blank test sheets during training sessions; the employee with a written order or a set of specifications who takes the written material to another employee, particu-

larly a younger employee and says, "I got something in my eye. How 'bout you reading this for me;" the employee, usually an older worker, who takes printed instructions to an apprentice and says, "O.K. Now you show me that you can understand these instructions."

The STI recognized the barriers to implementation of any possible program which might be suggested. He was very willing, however, to be part of a conduit system for information to move from Code 180 to the employees and from the employees to Code 180.

Supervisory Training Instructor of Shop 06

Shop 06 contains a wide variety and level of tasks. The abilities and backgrounds of the employees are also varied and wide. The need for educational development programs appears to be greatest at the lowest level of jobs. Mr. Saxon felt that the general educational background of the employee inhibited training. He was very receptive to both the identification of the problem and to suggestions of possible alternatives to alleviate the problem. He mentioned that an earlier G.E.D. program held at the shipyard did not inform the STIs as to what was going on. The STIs were expected to be involved in the transfer of information, but had not been part of the planning or any other aspect of the program. Mr. Saxon was very appreciative of being included in the process for this program.

Group Administrative Officer of Group 970

Mrs. Thomas indicated a need for developmental programs. She also recognized the associated problems. In addition to the anecdotes related by other interviewees, Mrs. Thomas told of instances of employees having others fill out application forms for them because they were unable to read and answer the questions on the applications themselves.

Mrs. Thomas also felt that some of the employees became locked into a position from which they could not move; they became stuck. Not only will Mrs. Thomas be supportive of any program, she suggested that she could announce our plans during her weekly meetings with the supervisors of her group as another means of funneling information to the waterfront employee.

Supervisory Training Instructor of Shop 64

Mr. Baker not only recognized a need for general educational development programs and the problems associated, he had already taken some specific steps in confronting the situation. He had included in his budget a provision for Adult Basic Education. In addition, Mr. Baker is in the process of conducting a survey of Shop 64. One aspect of the survey was ascertaining educational attainment levels and general educational development needs of the employees.

Supervisory Training Instructor of Shop 71

The paint shop appears to contain numerous low rating

positions. The supervisory training instructor of this shop was very open and willing to support any program which would be established. However, he did not seem to have a firm understanding of the dimensions of need or any problems associated with this need.

Supervisory Training Instructor of Shop 72

The workers of this shop are not required to have any speciality skill in order to fill these job ratings. Riggers and equipment cleaners often occupy the lowest wage-grade rating positions. Mr. Godwin was very interested in programs of general educational development. He felt that many of the employees in this shop needed to be involved in such an opportunity. He did not have, however, any statistics of how many employees were at each wage-grade rating nor of employee educational attainment levels.

Supervisory Training Instructor of Shop 99

Mr. Evans was very supportive. He suggested that when the notice of program is put out that the STIs and the TIs would be willing to be a conduit for information. In addition, he felt that the option should be provided for the waterfront employee to contact Code 180 directly if for any reason the employee did not want his TI to know he was going to sign up for educational development courses.

AUTOBIOGRAPHY

The author was born in Charlotte, North Carolina, on 21 July 1947. The author graduated from Agnes Scott College, Decatur, Georgia, June 1969 with a B.A. in English. The author received a M.S. in Education with an emphasis in Reading from Old Dominion University in December 1979.

The author taught English and social studies at Alexander Graham Junior High School in Charlotte, N.C.; taught adult basis education at Central Piedmont Community College; taught reading at John G. Richards State School for Boys in Columbia, S.C.; and was a communication skills specialist for Norfolk Public Schools. The author did two internships in 1981 at Norfolk Naval Shipyard in Portsmouth, Virginia.

The author received the Crawford-Rogers Scholarship Award in 1980. The author received research assistantships at Old Dominion University for both fall and spring semesters of the 1979-80 year. In addition, the author received a teaching assistantship at Old Dominion University for fall semester 1980. The author was an originating member of the Ph.D. in Urban Services Student Organization. The author also served as Ph.D. student representative to the Ph.D./U.S. Policy Committee.

The author is co-author with Dr. Betty H. Yarborough of the paper, "A Survey of Methods for Identifying Gifted

and Talented Students," presented at the Virginia Educational Research Association Conference.

The author chaired a research section at the Sixth Southeast Regional International Reading Association Conference in Norfolk, Virginia.