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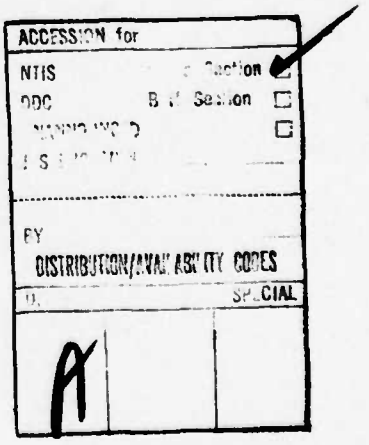

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Job enrichment is of interest to management because it offers a solution to motivational problems. Job enrichment programs, however, sometimes fail to increase worker satisfaction and performance as originally intended. The authors suggest that until its theoretical foundations are clearly understood, job enrichment will not achieve its full potential as a tool for organizational improvement. This research focused on the importance of inter-personal differences. It attempted to determine, through laboratory experimentation, whether individual growth and social need strength moderates the reaction to a job enrichment process. The research design involved a 2 x 2 fixed effects factorial experiment with enrichment (high or low) and task approach (team or individual) manipulated to create four different work situations. The experimental task involved construction of Erector set models. The sample was comprised of 124 AFIT Continuing Education students. Results confirmed that job enrichment increases satisfaction and found support for the moderating influence of growth need strength. Social need strength had a strong impact on amount of satisfaction obtained in a group work situation. The authors conclude that job enrichment and the team approach will be most successful when individual growth and social needs are considered.

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THE IMPACT OF GROWTH AND SOCIAL NEEDS ON THE JOB ENRICHMENT PROCESS-- A LABORATORY EXPERIMENT

A Thesis

Presented to the Faculty of the School of Systems and Logistics

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Degree of Master of Science in Logistics Management

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Chapter 1

INTRODUCTION

Recent years have witnessed a steady increase in management's concern with the human factor in achieving organizational objectives. Rising labor costs, scarcity of capital, and levels of productivity which are insufficient to sustain economic growth have forced managers to explore the potential of human contribution to output (Walton, 1972, p. 71). The growing implication is that this potential is far from being realized (Mills, 1975, p. 120). In addition, organizations have become more cognizant of their responsibility for the condition of the societal environment. The "open systems" organization model evaluates output not only in terms of goods and services rendered, but also in terms of the organization's contribution to the quality of life of its members (Kast & Rosenzweig, 1974, p. 110). Manifest worker dissatisfaction, with its attendant social costs (e.g., political alienation, violent aggression, sabotage, and alcoholism), indicates that this contribution requires substantial enhancement (Work in America, 1973, p. 28). Clearly, the typical organization is failing both itself and society by not realizing maximum return on its human resource input.

The Military Aspect

This shortcoming can be especially crucial in the military establishment. Because the penalty for failure of a strategic weapons system may be national extinction, the demands for quality and efficiency of work are greater in the military than in civilian industry (Herzberg & Rafalko, 1975, p. 38). Dwindling manpower coupled with increasing military mission responsibilities--the "doing more with less" syndrome--emphasizes the need for management techniques which maximize individual performance and satisfaction (Crooch, 1976, p. 56).

Job Enrichment -- A Solution?

One technique which shows considerable promise for attacking the costly organizational problems of worker alienation, dissatisfaction, and lack of motivation involves changing the nature of the job so that individuals are able to fulfill a larger proportion of their needs through work itself, as opposed to fulfillment through work-related benefits such as pay, security, travel opportunities and the like. This description broadly defines the technique of job enrichment. Initially, prominent behavioral scientists maintained that job enrichment would inevitably lead to more satisfied, motivated and productive workers (Herzberg, 1968; Roche & MacKinnion, 1970; Ford, 1973; Lawler, 1969; Budd, 1974). So bright were the prospects

for job enrichment that a special government task force studying dissatisfaction in the work force selected it as the most promising avenue for improvement:

> The redesign of jobs is the keystone of this report. Not only does it hold out some promise to decrease mental and physical health costs, increase productivity, and improve the quality of life for millions of Americans at all occupational levels, it would give, for the first time, a voice to many workers in an important decision-making process (Work in America, 1973, pp. xvii-xviii).

Expectations Exceed Results

Early successes in implementation confirmed this well-publicized potential. However, as efforts spread, an increasing number of failures raised serious questions about the continued viability of job enrichment as a tool for organizational change (Hackman, 1975, p. 130). One reason suggested for the lack of constant and unqualified success was that early theory ignored the moderating effect of differences among individuals (Hackman, Oldham, Janson, & Purdy, 1975, p. 60). The implication was that not everyone is motivated by work itself; that even the most complex, fulfilling jobs will only be motivating to individuals who have a strong innate desire for higher-order rewards (accomplishment, prestige, self-esteem) associated with those jobs (Nemiroff & Ford, 1976, p. 76).

Problem Statement

Much research in the area of job design centers around the proposition that success of a job enrichment

endeavor is somehow linked to the psychological make-up of the individual. No solid body of knowledge presently exists, however, which explains the relationship between job enrichment outcome and human nature (Hackman & Oldham, 1975, p. 159). One school of thought contends that the concept of "growth need strength" holds the key to understanding the way in which psychological needs affect employee response to enriched work (Hackman & Lawler, 1971, p. 284). Behavioral scientists, however, also emphasize social dimensions of behavior and argue that in addition to growth needs, individuals must also satisfy their needs for "relatedness "(i.e., social needs) in the organizational environment (Alderfer, 1972; c.f., Goldhaber, 1974, p. 212; Huse & Bowditch, 1973, pp. 116-117; Sims & Szilagyi, 1976, p. 226; Hackman & Lawler, 1971, p. 292).

The full potential that job enrichment holds for maximizing return on human resources cannot be realized unless its theoretical foundations are understood. While past research has indicated that individual growth need strength is a moderator in the job enrichment-job satisfaction relationship, its impact on the enrichment-productivity relationship still remains in doubt (Umstot, Bell & Mitchell, 1976, p. 388). The effect of individual needs for relatedness on the outcome of a job enrichment effort has yet to be studied. Consequently, additional research should be initiated to ascertain the moderating effect and possible

interaction of growth and social need strength on the job enrichment process.

Justification for the Research

Job enrichment efforts have already begun to revolutionize Air Force managerial philosophy. Despite present emphasis on pay and benefits, there is a growing awareness of job enrichment and of the possibility that the single most important element in human performance is design of work (Crooch, 1976, p. 56).

Unexplained variance in effectiveness. Very little is known, however, about the relative effectiveness of the various strategies for enriching jobs. This is indicated by the inability of existing research to explain exactly what happens (in terms of human behavior) when jobs are changed (Hackman & Oldham, 1975, p. 159). Similar job enrichment techniques may produce spectacular success in one organization and failure in another. While many benefits accrued from Air Force use of job enrichment at Ogden Air Logistics Center, Ogden, Utah, implementation was not completely successful in all areas (Herzberg & Rafalko, 1975, p. 42). In another study, job enrichment was shown to be a feasible strategy for improving motivation and productivity in an Air Force supply organization, but the success of the strategy varied according to organizational component. Certain types of jobs were found to be particularly suited to enrichment techniques while others were

not (Riske & Savoie, 1976, p. 40).

One reason given for apparent failure of a job enrichment experiment in a communication squadron at Maxwell AFB, Alabama, was that jobs were not really "enriched"; i.e., changes made were merely cosmetic and did not enhance worker need fulfillment. In addition, researchers indicated that group interaction processes were not considered in the experiment and that job enrichment efforts may have interfered with established social networks (Clark & Coughill, 1976).

These studies clearly indicate that a key element in job enrichment implementation involves the identification of those situations and individuals which will benefit most, in terms of increased performance and satisfaction, from job enrichment endeavors. Given such identifications, the Air Force will be in a position to increase the return from its investment in job enrichment and minimize the monetary and morale costs of failure.

Knowledge deficiency. This research employs a laboratory experiment to produce new knowledge that can be used to assist management in adjusting its job enrichment strategy to fit the individual and the situation. One concept which is explored is "growth need strength". While past field research has added to knowledge regarding the moderating effect of growth need strength in job enrichment, there have been relatively few laboratory

experiments which attempted to explain the significance of this variable. Moreover, conclusions emanating from these experiments sometimes conflict (Umstot et al., 1976, p. 380), as do results of field research (Stone, Mowday & Porter, 1976, p. 2). This study presents an opportunity to verify or contest existing theory.

Behavioral scientists have virtually ignored possible moderating effects of social need strength. Individual personality moderators which have been examined to date are itemized by Stone, Mowday & Porter (1976, p. 2) as follows: (a) belief in the Protestant ethic, (b) urban versus rural background, (c) growth need strength, (d) perceptual style, (e) needs for achievement and independence, and (f) educational achievement. Social needs are omitted. However, because of their significant impact on human behavior in an organizational setting (Alderfer, 1972, p. 113), it is intuitive that social needs would have an impact on the job enrichment process. Again, a laboratory experiment is deemed appropriate for studying the significance of this variable. According to Fromkin and Streufert (1970, p. 416),

> The absence of field experimental data in combination with recent invidious rejections of the laboratory constitutes a dilemma to the scientist or administrator who want to profit from the rich resources of the social scientist...laboratory data have considerable value for understanding and predicting organizational behavior.

Of the 88 studies on work-related topics listed during a recent Defense Documentation Center search, only one

involved a laboratory experiment. The opportunities for manipulation of variables and random assignment of personnel presented by a laboratory setting have not been fully utilized by most military-sponsored research. This study is designed to tap that unused source of knowledge.

Objective

The principal objective of this study is to determine, through laboratory experimentation, whether the magnitude of an individual's growth and social need strength is a significant determinant of his reaction to the job enrichment process.

An associated objective of this study is to measure the strength of the relationship between four variables which interact during the job enrichment process: (a) growth need strength, (b) social need strength, (c) satisfaction, and (d) performance (in terms of quality and productivity).

A third objective of this study is to determine whether any difference exists in fulfillment of social needs in a team task approach versus an individual approach.

Hypotheses

Nineteen hypotheses, which emerge from review of the literature (Chapter 2), are tested in this study. In order to more easily relate hypotheses to the problem under consideration and its related objectives, they are

divided into categories as follows:

1. Hypotheses concerning moderating effect of growth need strength (GNS):

   a. High GNS individuals working as a team on an enriched task will have a higher level of satisfaction than low GNS individuals working as a team on an enriched task.

   b. High GNS individuals working alone on an enriched task will have a higher level of satisfaction than low GNS individuals working alone on an enriched task.

   c. High GNS individuals working as a team on an unenriched task will have a lower level of satisfaction than low GNS individuals working as a team on an unenriched task.

   d. High GNS individuals working alone on an unenriched task will have a lower level of satisfaction than low GNS individuals working alone on an unenriched task.

   e. High GNS individuals working in an enriched job will have a higher level of productivity than low GNS individuals working in an enriched job.

   f. High GNS individuals working in an unenriched job will have a lower level of productivity than low GNS individuals working in an unenriched job.

   g. High GNS individuals working in an enriched job will have a higher level of work quality than low GNS individuals working in an enriched job.

   h. High GNS individuals working in an unenriched job will have a lower level of work quality than low GNS individuals working in an unenriched job.

2. Hypotheses concerning the moderating effect of social need strength (SNS):

   a. High SNS individuals working as team on an enriched task will have a higher level of satisfaction than low SNS individuals working as a team on an enriched task.

   b. High SNS individuals working alone on an enriched task will have a lower level of satisfaction than

low SNS individuals working alone on an enriched task.

c. High SNS individuals working as a team on an unenriched task will have a higher level of satisfaction than low SNS individuals working as a team on an unenriched task.

d. High SNS individuals working alone on an unenriched task will have a lower level of satisfaction than low SNS individuals working alone on an unenriched task.

e. High SNS individuals working in an enriched job will have a higher level of productivity than low SNS individuals working in an enriched job.

f. High SNS individuals working in an unenriched job will have a lower level of productivity than low SNS individuals working in an unenriched job.

g. High SNS individuals working in an enriched job will have a higher level of work quality than low SNS individuals working in an enriched job.

h. High SNS individuals working in an unenriched job will have a lower level of work quality than low SNS individuals working in an unenriched job.

3. Overall hypotheses:

a. Individuals working in enriched jobs will be more satisfied than individuals working in unenriched jobs.

b. Individuals working in enriched jobs will produce at higher levels than individuals working in unenriched jobs.

c. Individuals working in enriched jobs will demonstrate a higher level of work quality than will individuals working in unenriched jobs.

Chapter 2

LITERATURE REVIEW

This chapter provides a literature review that places the research effort in proper context. After providing a definition of concepts under study, the chapter will explore past research concerned with the relationship between job enrichment and individual differences, with special emphasis on theories that explain the moderating effect of growth need strength. Finally, the basis for hypotheses regarding social need strength is discussed in terms of ideas drawn from the literature.

Definition of Concepts

Job enrichment. In the introduction of this thesis, job enrichment was broadly defined as any technique that attempts to enhance individual need fulfillment by changing design of the work. This definition can now be strengthened to focus on technique involved. Umstot's (1975, p. 14) operational definition is considered most appropriate for purposes of this study:

> Job enrichment is the deliberate purposeful inclusion of, or increasing the amount of, such dimensions as variety, task identity (a whole and complete piece of work), task significance, autonomy, and feedback so that the individual will experience a sense of meaningfulness and responsibility in the job.

This definition may be expanded to include the results of an individual experiencing meaningfulness and responsibility in the job, namely increased satisfaction and performance (Hackman et al., 1975, p. 58).

The basis of the definition lies in the technique proposed by Hackman and Oldham (1975, p. 160) for measuring the job itself. In the "job characteristics" model, they measure the "richness" of a job in terms of five variables or core dimensions. The first three variables, skill variety, task identity, and task significance, will, according to the model, produce a psychological state wherein work is perceived as being meaningful. The fourth variable, autonomy, results in feelings of increased responsibility for the outcome of work, while the fifth variable, feedback, provides the individual with knowledge on results of his work. These psychological states, in turn, will result in desired job enrichment outcomes--high satisfaction and performance. Because of this causal relationship, core job dimensions may be manipulated and measured to achieve varying degrees of "richness" in a job. It is this technique, explained more fully in Chapter 3, which was used in the course of the laboratory experiment.

Growth Need Strength (GNS). The concept of GNS in job enrichment is concerned with the desire individuals have for obtaining higher-order rewards through work itself. Such rewards include a sense of accomplishment, prestige,

esteem, autonomy, and feedback on performance (Steers & Spencer, 1976, p. 1). These higher order rewards have commonly become known as "growth satisfactions" and the level of individual desire for them as "growth need strength" (Umstot, 1975, p. 19). The importance of GNS to the study of job enrichment can be appreciated more fully in the light of Alderfer's operational definition:

> Growth needs impel a person to make creative or productive effects on himself and the environment. Satisfaction of growth needs comes from a person engaging problems which call upon him to utilize his capacities fully...A person experiences a greater sense of wholeness and fullness as a human being by satisfying growth needs (1972, p. 11).

Social Need Strength (SNS). This concept is similar to GNS in that it is concerned with the level of an individual's desire for certain rewards from the organizational setting. Instead of "growth satisfactions" however, the SNS concept is defined in terms of "relatedness satisfactions" or meaningful relationships with co-workers. Meaningful relationships exist where individuals are able to share thoughts and feelings with others (Alderfer, 1972, p. 10). The strength of an individual's desire for meaningful relationships will be referred to as SNS.

It should be recognized that the definition of SNS has been purposefully narrowed for this research. Schutz (1958, p. 36) lists 48 different terms used by prominant psychologists to describe social needs. Included in this list is not only the need for "relatedness", but also needs

for control or dominance over others, love, democracy, inclusion, eroticism, and so on. Examination of existing theory clearly indicates the complexity of the social need concept and the possibility for divergent interpretations of its nature and measurement. However, Alderfer's (1972) interpretation is considered most appropriate because of its emphasis on the organizational setting as being the source of satisfaction. Those needs classified as "social", but which are satisfied primarily by family, neighborhood, political environment, or accumulation of power over others are not included in the concept of SNS as defined by this research.

Closely associated with Alderfer's "relatedness" definition is the concept of "Need for Affiliation" introduced by Steers and Braunstein (1976). Because their research indicates that the Need for Affiliation is satisfied by close interpersonal ties in the work environment (Steers & Braunstein, 1976, p. 262), it significantly contributes to the understanding of SNS for purposes of this study. In a similar fashion, Schutz's (1958) "Need for Affection" concept is related to SNS. For this reason, measurement of SNS (discussed more fully in Chapter 3) was based on two instruments: one developed by Steers and Braunstein and the other developed by Schutz.

Studies on the Effect of Differences Between Individuals

The importance of understanding interpersonal differences and their impact on the job enrichment process is illustrated by the abundance of available research.

The impact of educational level has been examined by Seybolt (1976, p. 66), who concludes that more organizational rewards are needed to satisfy well-educated employees as compared to less-educated employees. The implication is that enrichment efforts will be more successful with, hence should be focused on, employees with a higher level of education.

Hulin and Blood (1968) emphasized the importance of internalized work values and socio-economic background on an individual's reaction to the job. Job enrichment, they concluded, will produce increased satisfaction and productivity for only certain segments of the work force--principally those which continue to subscribe to the Protestant work ethic (Hulin & Blood, 1968, p. 50). In addition, demographic and cultural environment differences have been shown to moderate the effects of job enrichment (Sims & Szilagyi, 1976).

Despite the potential these variables have shown for explaining the "when and why" questions on job enrichment success, the variable of GNS has emerged as the most powerful in moderating individual reaction to job enrichment

(Pierce & Dunham, 1976, p. 90). A comparison of (a) GNS, (b) the Protestant work ethic, and (c) demographic background as moderators, found GNS to be the strongest (Wanous, 1974).

> In sum there is now substantial evidence that differences among people do moderate how they react to the complexity and challenge of their work, and studies using direct measures of individual needs seem to provide more consistent and strong support for this finding than do measures of subcultural background or of generalized work values (Hackman & Oldham, 1976, p. 255).

Results of Research on GNS

Research which attempts to isolate the exact effects of GNS in the job enrichment process is still in its infancy. Theorists are largely convinced that GNS is a significant indicator of psychological differences among people and plays an important part in their reaction to various job situations. While findings generally support this assumption, the precise nature and importance of GNS has not yet been determined (Umstot, 1975, p. 198).

GNS and psychological reaction. The most comprehensive analysis of GNS has been undertaken by Hackman and Oldham (1976) who measured its effects in the "job characteristics" model. Their basic assumption is that high GNS will impact in two ways:

> (a) It will increase the probability that an individual will feel better about an enriched job, and
>
> (b) It will increase the probability that an individual will, as a result, be more motivated, productive, and satisfied on the job.

Through correlation analysis, Hackman and Oldham found that GNS clearly influenced the relationship between type of job and psychological reaction. In jobs having high skill variety, task significance, autonomy and feedback (i.e., an enriched job), employees with high GNS experienced greater feelings of meaningfulness and responsibility. The only job characteristic which did not fit the pattern was "task identity"--the degree to which a job entails completion of a "whole" piece of work. This finding is generally supported by Umstot's (1975, p. 186) experimental simulation and the contingency model developed by Nemiroff and Ford (1976, p. 75). Other research findings are contradictory. Beer (1968, p. 221), for example, found that enriched jobs do not significantly increase fulfillment of higher order needs indicating, perhaps, that factors in addition to core job characteristics may influence feelings of high GNS individuals.

GNS and work outcome. While changes in psychological states induced by job enrichment are related (in the job characteristics model) to corresponding levels of individual GNS, evidence linking GNS to resultant changes in work outcome (satisfaction and performance) is not conclusive. Extensive field studies by Hackman and Oldham (1976) found high GNS individuals to show more internal motivation and, to a lesser degree, satisfaction after undergoing job enrichment than do low GNS individuals. The same studies

failed, however, to support the hypothesis that GNS moderated the job enrichment-performance relationship. While correlation between variables was in the predicted direction, the performance difference between high and low GNS individuals after job enrichment was not considered statistically significant ($p<.05$). This finding is supported by Umstot, Bell and Mitchell (1976, p. 388-391) as well as by Zierden (1976, p. 8) and Sims and Szilagyi (1976, p. 221). Again, results of research appear to conflict. Champoux (1976, p. 7) maintains that GNS has no effect whatsoever on work outcomes. In direct opposition to Hackman and Oldham, he states that neither satisfaction nor motivation is affected by GNS levels. People with enriched jobs had a positive outlook regardless of their level of GNS. This conclusion supports earlier research by Beer (1968, p. 221). In a study of clerical workers, Beer found that high GNS individuals were not more satisfied in complex, responsible jobs than they were in boring, routine jobs. Steers and Spencer (1976, p. 2) come to a similar conclusion.

GNS and hygiene. Research findings become more consistent, however, when attitudes toward job context (c.f. Herzberg's (1968) "hygiene" concept) are introduced into the analysis. If a person has high GNS and is satisfied with his pay, his job security, and his co-workers, he will usually react positively to enrichment of the job itself. Conversely, an individual who is dissatisfied with

job context and has low GNS will react negatively to job enrichment (Hackman and Oldham, 1976, p. 271). When faced with an enriched job, the low GNS individual may feel "stretched" more than he wants to be and therefore feels uncomfortable in the new environment (Hackman et al., 1975, p. 60). This finding has significant implications for the manager. Before attempting job enrichment, he must carefully assess both GNS and contextual sources of dissatisfaction. Deficiencies in either, if not corrected, must be considered in the job enrichment strategy (Porter, Lawler, & Hackman, 1975, p. 289).

GNS and management style. Zierden's work (1976, p. 12-14) also stresses the need for quantifying growth need strength before attempting job enrichment, and introduces yet another variable of organizational environment--managerial style. His congruency theory suggests that high GNS, a rich job, and an organic organization (one in which participative management is emphasized), represent the ideal combination for achieving satisfaction and performance. While his research supports this theory, it does not support the idea that congruency at the opposite end of the spectrum (routine job, low GNS, authoritarian leadership), also produce satisfaction and productivity. The thrust of his research indicates that high growth need individuals are not easily satisfied--they must have both a rich job and democratic organizational environment to be

happy. Low GNS individuals, however, will achieve satisfaction if either a rich job or democracy is present--both are not needed.

GNS - summary. Where do all these findings lead us? Can a set of cohesive and comprehensive principles be formulated to explain the practical significance of GNS? At this point, the moderating effect of GNS on individual response to job enrichment has not been precisely determined. While some relationships hold in the majority of research undertaken, others consistently fail to meet significance tests.

There is strong evidence, for example, to support the contention that GNS is a good indicator of differences between individuals. This proposition underlies all hypotheses made on GNS (1.a. through 1.h.).

In addition, the preponderance of research shows that individuals with high GNS are more satisfied with enriched jobs than are low GNS individuals. This relationship has been substantiated through a variety of research designs (Hackman & Lawler, 1971; Hackman & Oldham, 1976; Umstot et al., 1976; Sims & Szilagyi, 1976). It is reasonable, therefore, to assume that the GNS-satisfaction relationship would hold in different task environments (e.g., team approach versus individual approach). This is the basis for hypotheses 1.a. and 1.b.

Related hypotheses 1.c. and 1.d. explore the

converse situation, which receives less support from the literature. The possibility that a boring, routine job may be more satisfying to a low GNS individual and frustrating to a high GNS individual is suggested (Hackman et al., 1975, p. 56), but not supported (Hackman & Oldham, 1976, p. 274). Because there is an intuitive basis for believing the converse hypotheses, however, they were tested in this study.

The effect of GNS on performance level in an enriched job remains in doubt. While relationships are in the predicted directions, correlation coefficients do not meet statistical tests of significance. Hypotheses concerning GNS and performance (1.e. through 1.h.) reflect predictions of the literature as well as converse relationships similar to those discussed above.

The literature also indicates that GNS may be better explained when other variables are introduced into the analysis. Factors such as "pay context" and "management style" appear to explain some of the moderating effect of GNS but, more important, aid in understanding the overall efficacy of job enrichment. This experiment introduces the variable of social need strength into the analysis and, in so doing, attempts to strengthen the overall argument for job enrichment as a tool for organizational change. Hypotheses 3.a. through 3.c. are based on this reasoning.

The Relevance of Social Need Strength

The fact that GNS fails to account completely for the different reactions to job enrichment suggests that other human characteristics--perhaps intuitively unrelated to the need for growth--might have a moderating effect. Zierden (1976, p. 26) alludes to the emerging complexity of the situation by insisting that a simple measure of GNS is inadequate for predictive purposes. A more comprehensive theory, he argues, is required to explain the impact of individual differences on the job enrichment process.

Social needs in organizations. An examination of the literature on behavior in organizations suggests that individual social needs and the way in which they are fulfilled have a significant impact on attitudes toward work and, it can be assumed, on reactions to job enrichment.

> ...people need people. Every human being, because he lives in society, must establish an equilibrium between himself and the physical world. The social nature of man gives rise to interpersonal needs which he must satisfy...(Schutz, 1958, p. 30).

While the desire to satisfy these needs is used extensively to explain interaction in a group work environment (Alderfer, 1972, p. 146), there are some indications that social needs may have a more direct bearing on individual performance and satisfaction in the organizational setting. Morano (1974) suggests that social needs, as one element of an employee's value system, must be considered by management in fitting jobs to individuals. Similarly, Mankoff (1974)

maintains that if management is to understand motivation in work, it must be able to measure and interpret, among other personal characteristics, employee desires for friendship and social recognition.

This idea has significant implications for Air Force leadership. In a recent survey of airmen basics, seventy-four percent stated that they chose the Air Force over other services because of the opportunity to be associated with "nicer people" ("Why Do They Join the Air Force?, 1975, p. 22). Obviously, needs for relatedness are an ingredient of an individual's job choice and become more significant when their relationship to growth needs is examined. Alderfer (1972, p. 21) suggests that social needs must be satisfied before growth needs become a significant determinant of behavior. From this and preceding observations, it may be inferred that fulfillment of SNS is an important ingredient of an individual's behavior in an organization and, ultimately, of his satisfaction and performance on the job. Inductive reasoning suggests that any effort, such as job enrichment, designed to increase performance and satisfaction may be affected by levels of SNS involved and the way in which social needs are satisfied.

<u>SNS - how satisfied?</u> Formation of informal groups occurs spontaneously in an organization and usually without management assistance. This phenomenon is causally linked to the individual's continual pursuit of need

satisfaction. Belonging to a group presents him with an opportunity to satisfy needs which he is unable to satisfy in isolation (Huse & Bowditch, 1973, p. 116). While various types of needs might be fulfilled in a group, prevailing literature emphasizes the importance of groups in terms of their ability to satisfy social needs (Goldhaber, 1974, p. 212; Yalom, 1970, p. 81; Schutz, 1958, p. 14; Huse & Bowditch, 1973, p. 117). This proposition provides the underlying basis for manipulation of task approach in this experiment. The team task approach offers subjects an opportunity to satisfy SNS; the individual approach does not.

As can be inferred from the following examination of literature, the degree to which an individual's SNS is satisfied may affect his reaction to job enrichment. This inference forms the basis for earlier hypotheses on the moderating effect of SNS on the outcome of job enrichment.

Lessons from psychotherapy. According to psychiatrist Irvin Yalon (1970), curative powers of group therapy depend upon the ability of the group to satisfy social needs. From this it follows that the extent to which an individual is helped by group therapy depends upon his level of interpersonal needs. Positive outcomes would be expected from people with high SNS, while people with low SNS might have minimal or negative reactions (Yalon, 1970, p. 81).

SNS and job satisfaction. Yalon's theory could

easily be applied to the organizational setting--high SNS individuals would be expected to be more satisfied when working in groups than would low SNS individuals. Research by Sims and Szilagyi (1976, p. 226) supports this extrapolation. In a sample of research and development employees, Sims and Szilagyi found that jobs with high opportunities for social interaction were more satisfying to individuals with high SNS. This conclusion confirms an earlier, unsubstantiated prediction by Hackman and Lawler (1971, p. 283) and is the basis for hypotheses regarding SNS and satisfaction (2.a. through 2.d.).

SNS and job performance. Alderfer's (1969, p. 425) field research brings additional understanding to the relationship between SNS and job enrichment. Interaction among co-workers and with supervisors, he contends, is less structured, hence more complex, on enriched jobs. Thus, individuals with greater facility for "getting along with people" will react more positively, in terms of performance, to those enriched jobs. By extending Alderfer's analysis, it could be inferred that high SNS individuals would be more productive in enriched jobs than would low SNS individuals. In routine or unenriched jobs the opposite (i.e., low SNS individuals more productive) might be true. This rationalization is the basis for earlier hypotheses relating SNS, job enrichment and performance (2.e. through 2.h.).

Chapter 3

METHODOLOGY

The purpose of this chapter is to describe the methodology used to explore the variance in individual reaction to job enrichment. After providing a brief overview of research design, the chapter will define the population under study and nature of the sample; describe the experiment; enumerate variables being analyzed and their corresponding measurement methods; examine control of extraneous variables and possibilities for confounded results; and finally, provide a description of statistical techniques employed to test hypotheses.

Overview of Research Design

In order to analyze effects of job enrichment in an organizational setting, four different work situations were simulated and individual reaction to them measured. The research design involved a 2 x 2 fixed effects factorial experiment with enrichment (present or not present) and task approach (team or individual) as independent variables. Each subject participated in one of four work situations which were created by manipulation of independent variables as illustrated by Figure 1.

		Task Approach: TEAM	Task Approach: INDIVIDUAL
Degree of Task Enrichment	HIGH	Enriched Task performed in teams	Enriched Task performed individually
	LOW	Dull Task performed in teams	Dull Task performed individually

Figure 1. Four different work situations created by manipulation of independent variables.

In conjunction with their participation, subjects were also asked to complete questionnaires designed to measure individual psychological make-up (GNS and SNS), level of satisfaction experienced in the simulated task environment, and perceived degree of enrichment present. Task performance was measured objectively by visual inspection of degree and quality of task completion. The data base thereby constructed was analyzed statistically in order to obtain support for hypotheses made.

Population and Sample

The population to which research findings will be inferred is the Department of Defense (DOD) work force. The sample was comprised of 124 individuals enrolled in five randomly selected Continuing Education classes convened at the Air Force Institute of Technology (AFIT) during Spring, 1977. Members of each class were randomly divided

into four "cells" corresponding to the four work situations described above. A summary of the class breakdowns in provided in Table 1. It will be noted that cell sizes were not identical in each class, principally because team assignments were made in increments of four* which precluded an even four-way class split. Overall totals in each cell, however, were approximately equal and fulfilled observation quotas needed to perform hypothesis tests.

Demographic features of sample. Rank and career field information was collected on participants via questionnaire and is summarized in Table 2. It will be noted that middle-level managers in procurement, maintenance, and supply predominated the sample. The median civilian general service grade was GS-11, while the median military rank was 0-3 (Air Force Captain).

Mandatory participation. Participation was made a mandatory element of the Continuing Education curriculum for each of the five classes used. No students hesitated to participate. The mandatory nature avoided the possibility of systematic bias which might have occurred through use of volunteers. Only one class underwent experimentation at a time. Total class time required for the experiment, including introduction, administration of questionnaires,

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*The rationale behind a team size of four is given later in this chapter under the sub-heading, "Task Approach".

Table 1

Summary of Continuing Education Classes Used and their Breakdown into Experimental Cells

Class No.	Description	Breakdown of Subjects by Cell				
		Team Approach		Individual Approach		Total
		Enriched Task	Unenriched Task	Enriched Task	Unenriched Task	
131C	Industrial Maintenance Management	8	8	6	7	29
224E	Logistics Management	8	8	5	5	26
261E	Maintenance Management Information Systems	4	4	10	9	27
345C	Introduction to Quantitative Analysis	4	4	5	6	19
370C	Defense Data Management	4	4	7	8	23
	TOTALS	28	28	33	35	124

Table 2

Rank and Career Field Information on
Participants in Laboratory Experiment

Rank	Career Field: Procurement	Maintenance	Inventory Management	ADP	Aviation	Other	Totals
Military Officer							
0-5		3				1	4
0-4	1	5	2		2	2	12
0-3	1	6	1		1	5	14
0-2		3	1			1	5
0-1	1					1	2
Subtotal	3	17	4		3	10	37
Military Enlisted							
E-7		1				2	3
Civilian (GS)							
GS-5	1		2	1		3	7
GS-6				1			1
GS-7		1				1	2
GS-9	2	4	2	2		2	12
GS-11	6	8	5	2		6	27
GS-12	5	2	2	3		1	13
GS-13	1	2	1	1		3	8
GS-14		1					1
Subtotal	15	18	12	10		16	71

Table 2 (cont)

Rank	Career Field: Procurement	Maintenance	Inventory Management	ADP	Aviation	Other	Totals
Civilian (WS)							
WS-9		1					1
WS-10		4					4
WS-11		6					6
WS-13		1					1
WS-15		1					1
Subtotal		13					13
Grand Totals	18	49	16	10	3	28	124

and debriefing was approximately ninety minutes.

Possible bias in sample? It is recognized that this sample may have suffered from systematic bias since middle to upper echelon managers predominated enrollment. This bias, however, was counteracted by the randomized nature of the sample itself--many different elements (i.e., commands and agencies) of the DOD work force were represented. In addition, participants did not engage in their normal roles while part of the contrived work situation. In opposition to a field experiment where measurements are drawn from an established environment with well-defined job roles, the laboratory method created an environment where each participant was reduced to the level of a non-supervisory worker. Neither rank structure, past work history, nor personal preference were considered during conduct of the experiment or analysis of results. This is the basis for the assertion that conclusions may be generalized to the entire DOD work force. Such a generalization will make this research useful for ascertaining job enrichment potential within DOD.

Advantages of the sample. The choice of this particular sample was obviously due, in part, to its convenience and proximity. Other advantages of using Continuing Education students, however, should not be overlooked. A deficiency of many laboratory experiments in organizational behavior is that subjects are college freshmen and

sophomores (usually psychology students) who may, due to differences in maturity and exposure, have different attitudes than workers in organizational settings whom they purportedly represent (Alderfer, Kaplan, & Smith, 1974, p. 508). Laboratory experiments using workers themselves are obviously costly and disruptive; hence, relatively few have been attempted (c.f. Umstot, 1975, pp. 88-100). It is for this reason that DOD employees on temporary duty at AFIT constituted an excellent sample. Because of their maturity and lengthy exposure to organizational environments, they were considered more representative of a typical work force than college students.

Design of the Experiment

The task itself. Each of the four work situations involved assembly of Erector set models. The goals in each situation were similar--construction of a pre-specified model or models. Tools and raw materials made available were likewise similar in each situation.

The experimenter served as the work "supervisor", giving instructions, answering questions, and providing feedback when applicable to participants on their performance. The way in which the experimenter behaved in each of the contrived work situations contributed to the manipulation of the "enrichment" variable, discussed in detail below.

The four work situations were physically separated. Subjects in each were directed into the appropriate class or conference rooms in the AFIT School of Systems and Logistics where tables, chairs, and materials were prepositioned to facilitate participation. Behavior of the experimenter and work environment were held as consistent as possible throughout all replications to minimize the possible impact of extraneous factors.

Thirty minutes was allotted to task completion. In order to insure that time was, in fact, a constant, the amount of work assigned was great enough to preclude any participant from finishing. Quantity by itself was therefore an accurate measure of productivity without adjustment for actual time worked.

Job enrichment manipulation. The Hackman and Oldham (1976) "Job Characteristics" model, described briefly in Chapter 2, provided the theoretical basis for experimental manipulation in this research. The degree of enrichment in any job, according to the model, is determined by five core dimensions:

1) Skill Variety - amount and variety of different activities in carrying out the work.

2) Task Identity - the degree to which the job requires completion of a "whole", identifiable piece of work.

3) Task Significance - the importance of the job to other people or organizations.

4) Autonomy - amount of freedom and independence given to the individual in carrying out his work.

5) Feedback - amount of information the individual is given regarding his performance.

Each core dimension may take on a numerical value from one to seven. The amount of enrichment present in a job may thus be quantitatively measured by calculating its Motivating Potential Score (MPS) as follows:

$$MPS = \left(\frac{\text{Skill Variety} + \text{Task Identity} + \text{Task Significance}}{3} \right) \times \text{Autonomy} \times \text{Feedback}$$

An enriched job would have a high MPS, while a dull or unenriched job would have a low MPS. As is seen from the formula, increasing the amount of any of the five core dimensions present in a job will enrich that job. Conversely, decreasing those amounts will make the job more routine; i.e., unenriched (Hackman & Oldham, 1976, p. 258).

The contrived environment and short duration of a laboratory experiment made it difficult to devise a task which could take on varying amounts of the five core dimensions and in that way create the desired enrichment dichotomy. The Erector set task, however, lent itself to manipulation according to the Hackman-Oldham formula and was therefore well suited to purposes of this research. Assembly of Erector models had first been used in organizational research by Farr (1976) in his study of the relationship between job enrichment, pay, and intrinsic motivation. Manipulations used to create two levels of job enrichment

in that laboratory experiment were highly successful (Farr, 1977) and were duplicated according to guidelines set forth in Table 3. A detailed description of conduct by researchers in carrying out the laboratory experiment is found in Appendices A and B.

It will be noted that the degree of enrichment present in the contrived work situation was a product of both the task itself and information/direction provided by the experimenters. Manipulations thus parallel an actual work situation where the level of job enrichment present is affected not only by intrinsic features of the work, but also by environmental inputs which influence worker perceptions.

To verify effectiveness of strategy outlined in Table 3, an independent manipulations check (similar to that used at Pennsylvania State University) was conducted as described in the section entitled, "Variables and their Measurement."

Task approach. In order to measure impact and satisfaction of social needs on job enrichment, participants worked on the Erector set task either individually or in teams. Manipulations of this condition were obviously easy to accomplish and involved only random assignment of individuals to one or the other approach. Formation of the teams themselves was done on a random basis.

It should be emphasized that adverse effects from

Table 3

Summary of Experimental Manipulations Used to Induce High and Low Enrichment Conditions

Core Dimension	Manipulations: Enriched Task	Manipulations: Unenriched Task
Skill Variety	1) Participants were given a choice of three Erector models to build.	1) Participants were directed to build a particular component.
	2) Instructions emphasized the complexity of the task, e.g., "Although it seems trivial, it has real world applications."	2) Instructions stressed the routine, boring nature of the task, e.g., "People of your grade-level will find it simple."
Task Identity	1) Subjects completed a "whole" relatively complex model.	1) Subjects built only simple components of a larger model.
	2) Instructions emphasized the "start to finish" aspect of the task and the fact that the individual or team was fully responsible for model quality.	2) Instructions emphasized the insignificance of the component in comparison to the whole model. Subjects were held responsible only for the small component but not for the whole assembly.
Task Significance	1) Instructions emphasized the unique nature and importance of the Erector set exercise. Subjects were told of its applicability to their jobs as managers and to the solution of DOD motivational problems.	1) No information on the applicability potential of the Erector task was given.

Table 3 (cont)

Core Dimension	Manipulations: Enriched Task	Manipulations: Unenriched Task
Autonomy	1) Participants were given complete freedom to move around, take breaks as they desired. 2) Participants replenished their own materials from a central location, in whatever quantities they deemed appropriate.	1) Participants were asked to remain seated throughout the exercise. 2) Nuts, bolts, braces, and other parts were prepositioned on work tables in quantities sufficient to continue work until time was called.
Feedback	1) Completed models were allowed to remain on the work table in plain sight of the participant. 2) Since participants were free to move about and did so to replenish parts, they were able to observe classmates and thereby compare performances.	1) Experimenters removed models from the work table as they were completed. 2) Participants were asked to remain seated throughout. Work tables were arranged so as to make visual comparisons with classmates difficult.

group interaction are minimized in the laboratory setting. According to Hackman and Morris (1975), the possibility of confounded results due to variation and diversity in interpersonal behavior is virtually eliminated in the laboratory. When a group is convened for a short time for the express purpose of the research, it does not have a chance to develop its own history or its own unique normative structure. For this reason, detecting and describing desired relationships between variables being measured (e.g., SNS and satisfaction, etc.) is enhanced (Hackman & Morris, 1975, pp. 59-60).

A major decision facing experimenters in this research was determination of optimum team size. As groups increase in size, the effort needed to coordinate individual efforts may be greater than that needed to complete the task itself. Consequently, satisfaction and productivity may suffer more as a result of large team size than any other variable present (Steiner, 1972, p. 83). To avoid this phenomenon, known as "group process loss", teams of "small" size were considered appropriate for this experiment - "small" groups being defined as numbering five or fewer individuals (Steiner, 1972, p. 84).

The choice of exact size was based on O'Dell's (1968) research. In a study of interaction in small groups (two to five people), he found that a group of four demonstrated the following advantageous characteristics: (1) produced most beneficial interaction, (2) showed least

tension, and (3) exchanged most information (O'Dell, 1968, pp. 75-78). A team size of four was therefore considered ideal for purposes of this experiment.

Variables and Their Measurement

Before discussing specifics on measurement of variables, it is considered appropriate to briefly summarize the research from a broad perspective. Simply stated, it was an attempt to measure relationships between three characteristics present in virtually any organizational work situation:

1) The nature of the work.
2) The outcome of the work.
3) The psychological make-up of individuals performing the work.

Seven variables have been introduced to measure these characteristics. The independent variables of task enrichment (enriched versus unenriched) and task approach (team versus individual) correspond to the nature of the work. Dependent variables of satisfaction, productivity, and quality correspond to the outcome of the work. Social and growth need strength are moderating variables which measured the way in which psychological make-up affected the relationship between independent and dependent variables. This section will describe variables in detail and their associated measurement techniques.

Independent variables. The manipulation of the two independent variables to produce four different work situations was previously described in detail and will not be restated. It will be noted that each independent variable is measured on a nominal scale; e.g., enrichment is either present or not present, opportunity to satisfy SNS is either present (team) or not present (individual).

A manipulations check on the enrichment independent variable was performed using a modified version of the Job Diagnostic Survey (JDS) short form, which is found in Appendix C. The JDS, developed by Hackman and Oldham (1975) measures the degree of enrichment in a job as perceived by the worker, and therefore provided independent confirmation of the effectiveness of experimenter manipulations with the Erector set task. The JDS has received wide use in field research because tests show it to be a valid and reliable measure of enrichment present in a job (Hackman & Oldham, 1975, p. 168).

Some modification to the standard JDS, however, was required to make it appropriate for use in the laboratory setting. The version found in Appendix C incorporates changes necessary to insure compatibility with the Erector set exercise. This version is similar to that successfully validated in experiments at Pennsylvania State University (Farr, 1977). Responses to questions are on a 7-point Likert scale and correspond to core dimensions as indicated

in Appendix D. Individual responses thus obtained were averaged in order to calculate MPS scores of the Erector tasks according to the Hackman and Oldham formula. MPS has a theoretical range of one to 343 and is interval level data.

It is important to note that enrichment manipulations should not have been affected by manipulations of the other independent variable, task approach. In other words, both versions (high or low enrichment) of the Erector task should have retained a constant level of enrichment (as measured by MPS) whether performed individually or by teams. This assertion is based on studies of group interaction by Hackman and Morris (1975, p. 60) who concluded that the same enrichment techniques that work for individuals (i.e., manipulation of five core dimensions) may also be applied to groups with similar results.

Dependent variables. Work satisfaction was measured using a modified version of the Job Descriptive Index (JDI) developed by Smith, Kendal and Hulin (1969) at Cornell University. While the original version of the JDI measures satisfaction with five aspects of a job (work itself, supervision, pay, co-workers, and promotion opportunities), its applicability in this laboratory experiment was limited to two aspects: the work itself and the supervisor. It was these two factors which were manipulated to create the enrichment dichotomy. Farr's (1977) modified version of

the JDI was well suited to laboratory experimentation and was used in this research. The "work itself" portion of the standard JDI was retitled the "Erector Set Task" and used intact. The "supervision" scale was retitled "Leader" and used intact. The modified version of the JDI is found in Appendix E. It will be noted that this instrument was divided into two parts: one to measure reaction to the task itself, the other to measure reaction to the experimenter. This method of separation is typical in field administration of the JDI because it helps respondents determine more precisely the information desired.

The validity and reliability of the JDI in measuring work satisfaction is well-established. Vroom has called it "the most carefully constructed measure of job satisfaction in existence today" (1964, p. 100). A work attitude survey at the Veterans Administration Hospital in Brooklyn, New York confirmed that the JDI measures what it intends to measure (i.e., satisfaction) and is superior to another leading instrument, Porter's Need Satisfaction Questionnaire (Imperato, 1972). The JDI has other advantages which make it particularly well suited to this research. Its low level of abstraction makes it harder to guess what the experimenter wants, and it is easy to fill out and score (Umstot, 1975, p. 132).

Satisfaction was measured on an interval scale with scores theoretically ranging from zero to 54 on both the

"task" scale and the "leader" scale. Scoring was done in accordance with the Smith, Kendall and Hulin (1969, pp. 79-83) revised weighting system. Only "satisfaction with task" scores were used in hypotheses tests concerned with job satisfaction. "Satisfaction with leader" scores were tabulated in order to determine whether conduct by the two experimenters had been perceived as significantly different by participants in terms of JDI criteria. A correlation between this measure of satisfaction and experimenter, however, produced a coefficient of .02 which was not significant. Thus, possible personality differences between experimenters did not significantly affect reaction to manipulations.

The modified JDS (Appendix C) and modified JDI (Appendix E) were combined and administered as a three-part questionnaire immediately after participants had completed the Erector exercise. Each respondent entered the last four digits of his social security number to enable researchers to match it with the corresponding GNS-SNS instrument completed earlier. (Format and administration of the GNS-SNS questionnaire is discussed in detail under the section entitled, "Moderating Variables" which follows.)

The remaining dependent variables, productivity and quality, were measured via objective experimenter observation. Productivity scores were based on the number of nut and bolt connections made during the thirty minute time

period. This measure gave a more comparable index across experimental conditions than would have units of production (e.g., number of Erector set models completed or percentage of a model completed), since the specific task varied slightly in each work situation. Productivity data was at the ratio level having a range beginning at zero with an unspecified upper bound.

Quality of performance was measured using techniques similar to those successfully employed at Pennsylvania State University in unpublished research. In a comparable Erector set experiment, quality of models completed was subjectively evaluated on a one-to-five scale by three individuals--the experimenter, an academic associate, and an unconnected third party. Evaluations were based on accuracy and tightness of nut and bolt connections. Respective scores for each rater were correlated at $R>.9$, indicating that the technique provided a reasonable degree of accuracy in measuring quality (Farr, 1977). In this study, an element of objectivity was incorporated by having three raters utilize the "performance score sheet" found in Appendix F. The score sheet lists six different criteria by which an Erector model may be qualitatively evaluated. The rater entered a number from one to five opposite each of the criteria to indicate the degree to which an individual's work conformed to criteria requirements. Scores were averaged for each participant resulting in interval

level data with range zero to thirty.

While correlation coefficients in this experiment were not as high as the Farr study, all were significant at alpha = .001 and are therefore considered reliable indicators of work quality. Table 4 summarizes correlations between quality raters.

Table 4

Correlation Coefficients between Quality Raters*

	Experimenter 1	Experimenter 2	Blind Rater
Experimenter 1	----	.756	.657
Experimenter 2	.756	----	.658
Blind Rater	.657	.658	----

*All coefficients significant at alpha<.001

Limitation on dependent variables. While satisfaction scores in all four simulated work situations were suitable for analysis, only individual productivity and quality scores were used. Since the team task approach required participants to work on the Erector task jointly, measures of team productivity and quality reflected the aggregate of individual efforts and were considered inappropriate for any test of hypotheses relating job enrichment and performance. It will be noted that the nineteen hypotheses stated in Chapter 1 ignore any relationships between performance and enrichment in a team environment. While unsuited to purposes of this specific study, however, team

performance figures were tabulated and analyzed apart from hypotheses tests. Such analysis was performed to enable recommendations for future research as well as for modifications to techniques employed.

Moderating variables - method of measurement. Both GNS and SNS were measured using the questionnaire appearing as Appendix G. This instrument was distributed to participants and completed as part of their Continuing Education course curriculum before they engaged in the laboratory task itself. There were two reasons for this procedure:

1) After completion of the Erector task and the MPS-satisfaction questionnaire, fatigue may have precluded thoughtful completion of the GNS-SNS questionnaire.

2) GNS and SNS are measures of psychological makeup and are therefore unrelated to the specific situation at hand. The possibility existed, however, that participants might have answered the GNS-SNS questionnaire only in terms of their reaction to the laboratory experiment. In field administration of the questionnaire this would, of course, not happen. The fact that participant response to the MPS-satisfaction questionnaire was based on the laboratory exercise,however, could have inadvertently carried over to the GNS-SNS instrument if it had been administered immediately thereafter.

The questionnaire found in Appendix G combined selected portions of three widely used and validated

instruments: 1) The Hackman-Oldham (1975) GNS questionnaire 2) The Steers-Braunstein (1976) Manifest Needs Questionnaire (MNQ) and 3) The Schutz (1958) Fundamental Interpersonal Relations Orientation questionnaire (FIRO-B).

To facilitate response and insure conformance with already validated formats, the GNS-SNS questionnaire was divided into two parts. Questions in Part One were in the general format of the Hackman-Oldham instrument which measures GNS in terms of how much the individual "would like" to have various opportunities and attributes in his job. Response categories were 7-point Likert scales ranging from "would like a moderate amount" to "would like extremely much". This questionnaire format has been used extensively by behavioral scientists in both field and laboratory settings to measure GNS, with results attesting to its value as a measurement tool (Hackman & Lawler, 1971; Umstot, 1975; Farr, 1976; Brief & Aldag, 1975; Sims & Szilagyi, 1976). It was therefore considered appropriate for this research. Part One also contained five original SNS questions in the same "would like" format. Several researchers (indicated in Appendix H) participated in formulating the wording of these particular SNS questions which augment previously used SNS instruments appearing in Part Two. Since the Steers and Braunstein (1976) MNQ, however, provided the original inspiration, the five questions will be referred to as the "reformated Steers" SNS measure. Because standard practice

calls for mixture of GNS questions with "dummy" questions, it was assumed that insertion of five additional SNS items would not compromise the validity of the Hackman-Oldham GNS instrument.

Part two of Appendix G asked respondents to indicate also on a 7-point scale, their degree of agreement or disagreement with statements listed. Five of the 16 statements measured individual SNS in the exact format appearing in the "Need for Affiliation" section of the MNQ. All portions of the MNQ have been tested by its authors with results showing it to exhibit reasonable levels of convergent and discriminant validity for research purposes. In addition, conclusions generated by subsequent research using the MNQ were consistent with existing theory concerning job attitudes in the organizational setting (Steers & Braunstein, 1976, p. 264).

To augment MNQ "Need for Affiliation" items, this research utilized selected portions of the Schutz (1958) FIRO-B which is also a tested and accepted SNS measurement tool. A combination of measurement devices for SNS was considered appropriate because no questionnaire has yet been developed which precisely coincides with the Alderfer definition of SNS stressed in this research. The Schutz "Need for Affection" concept and the Steers and Braunstein "Need for Affiliation" concept, however, appear to converge within the boundaries of Alderfer's definition. Because the

instruments associated with these two concepts have been validated and have an acceptable degree of reliability, they are well qualified for use in further research. Response to all SNS questions, regardless of source, was on a 7-point Likert scale and therefore conformed to desired format. All three SNS measures--1) reformated Steers 2) Steers unchanged and 3) Schutz FIRO-B--maintained their identities throughout all analysis. Computations involving SNS hypothesis tests were repeated three times--once for each SNS measure. This approach was considered appropriate because of the exploratory nature of the research insofar as SNS is concerned. Analysis using all three maximized the probability of isolating any moderating effect of SNS if, in fact, any existed.

Part two further incorporated five items from the "Need for Achievement" section of the MNQ. While the "Need for Achievement" concept bears some similarity to the concept of GNS, it has a narrower focus and might therefore enable greater precision in measurement of behavior characteristics which impact on the success of a job enrichment endeavor. Because "Need for Achievement", however, was not addressed by hypotheses enumerated in Chapter 1, responses to these items were not used in computations associated with statistical tests. Rather, data thereby collected was analyzed separately to determine whether the concept of "Need for Achievement" holds potential for further explaining reaction

to job enrichment. In so doing, possibilities for follow-on research were identified.

The GNS-SNS questionnaire found in Appendix G incorporated two other advantages:

1) It was easy to use and score. It therefore met the practicality criterion for measurement devices (Emory, 1976, p. 126).

2) It minimized social bias (i.e., the tendency of an individual to respond with an answer perceived as "socially correct", rather than one which accurately reflects his internal attitude). The mixture of GNS questions, SNS questions and "dummy" questions along with reverse scoring are useful techniques for avoiding automatic responses and for disguising the real motives of the experimenter.

Moderating variables - high-low stratification. Composite GNS and SNS scores for each individual were computed by averaging responses to applicable questions. While resultant figures were at the interval level, each composite score was reduced to a nominal scale (high-low) for purposes of statistical analysis.

In this research, those individuals with component scores over 6.3 were classified as "high GNS", and those with scores under 5.4 as "low GNS". Similarly, individuals with SNS scores over 4.6 (Steers), 4.33 (reformated Steers), 4.67 (Schutz) were defined as "high SNS", while those under

3.8 (Steers), 3.0 (reformated Steers), 3.67 (Schutz) were "low SNS". The arbitrary nature of this split is acknowledged, but similar methods have been used with apparent success in job enrichment research (Hackman & Lawler, 1971; Sims & Szilagyi, 1976, p. 219). The specific technique employed in this research to categorize GNS and SNS scores as "high" or "low" was identical to that used by Umstot (1975). A three-way split of all observations was made according to GNS and SNS. Observations falling in the top third were classified as "high" GNS (or SNS), while those in the lower third were classified as "low". Those observations which fell in the center of the distribution were considered "too close to call"; i.e., a "high" or "low" classification would be meaningless. Resultant cutoff points for each measure were identical in each of the four experimental cells, therefore permitting comparisons of dependent variables using Analysis of Variance (Lawrence, 1977). Table 5 summarizes the stratification performed.

Moderating variables - results of factor analysis. Responses to the GNS-SNS questionnaire were subjected to factor analysis in order to determine internal consistency of the Hackman-Oldham GNS measure as well as the three different SNS measures used in this research. Because the six GNS questions demonstrated high internal consistency with rotated matrix factor loadings ranging from .47 to .74, individual GNS scores were calculated as originally planned.

Table 5

Results of Sample Stratification by GNS and SNS*

	High Sector			Middle Sector (eliminated)			Low Sector		
Variable	# obs	Mean	Range	# obs	Mean	Range	# obs	Mean	Range
GNS	40	6.70	6.3-7.0	44	5.83	5.4-6.3	38	4.70	2.3-5.4
SNS-Steers MNQ	35	4.88	4.6-5.6	51	4.20	3.8-4.6	36	3.58	2.8-3.8
SNS-Reformated Steers	33	5.25	4.4-7.0	47	3.89	3.0-4.4	42	2.44	1.0-3.0
SNS-Schutz	31	5.39	5.0-6.7	53	4.30	3.7-5.0	38	3.33	2.0-3.7

*Ties in scores prevented equal numbers of observations in each sector.

Note: Two participants failed to complete the GNS-SNS questionnaire. This resulted in a total of 122 observations in sectors defined above, versus total participation of 124.

Factor analysis, however, disclosed some irregularities in all three SNS measures. Only three out of the six questions taken from the Schutz FIRO-B loaded well together (factor loadings ranging from .55 to .65). Because questions 1, 7, and 13 appeared to be measuring a characteristic apart from the other three (loadings less than .2), they were not included in computation of Schutz SNS scores. Similarly, two questions (numbers 6 and 8) were omitted in calculation of the reformated Steers SNS scores. The remaining three questions on which this SNS score was based loaded well together with a range from .34 to .84. The internal consistency of responses to the five questions from the Steers MNQ was marginal (factor loadings = .33, .36, .25, .38, .37). Because previous testing has found greater internal reliability in this SNS measure (Steers & Braunstein, 1976), however, this research used all questions in calculating a composite SNS score based on Steers MNQ. A summary of questions actually used for all three SNS measures is indicated by footnote in Appendix H.

Control of Extraneous Variables

While the manipulative aspects of a laboratory experiment are designed to eliminate effects of extraneous variables, the possibility of confounded results always exists. This research was no exception. For this reason, identification of possible extraneous variables is considered

appropriate at this time, along with a discussion of design factors which were helpful in reducing their effect.

Specialized sample. Perhaps the greatest possibility for erroneous generalization of conclusions was due to the specialized nature of the Continuing Education curriculum and resultant level of specialization within the sample. Individuals in logistics classes might have reacted differently in the laboratory environment because of their logistics background than might have individuals in a maintenance curriculum. This research attempted to counteract systematic bias within classes by the random selection features followed throughout. Classes to be used in the experiment were selected randomly from the Continuing Education Spring 1977 schedule. Individuals were randomly assigned to one of four contrived work situations using a random number table; teams were formed randomly. The randomization feature also reduced effects of individual characteristics such as rank, sex, and appearance which were not addressed by this research.

> Random selection and assignment of individuals provide rich rewards for the experimenter. These include improved generalization of results and counterbalancing of extraneous factors (Erickson, 1970, p. 15).

Unintended deviations. Other extraneous variables may have become significant because of unintended changes in technique between replications. Obviously, changes in experimenter attitude, environmental conditions, and

facilities can affect reliability of data. To counteract this possibility, instructions and task environment were standardized to the greatest extent possible. Instructions were written in advance and read at the onset of each replication to insure that all participants received identical guidelines. Instructions used in each replication are found in Appendices A and B.

Manual skill superiority. The possibility also existed that task performance was a function of participant finger dexterity rather than task situation or psychological make-up. Hackman and Morris (1975, p. 69) contend, however, that experiments requiring individuals to assemble a number of very simple mechanical devices should not be responsive to differences in skill. Since the Erector model may be considered a "simple mechanical device", the chances for biased data due to differences in manual skills were minimal.

Sensitized subjects. The one disadvantage of a laboratory experiment that cannot be overcome involves sensitization of participants. Subjects were obviously aware of the experimental nature of the task and might have consequently performed or answered questionnaires differently than they would have in an actual work situation. The technique of integrating the Erector set exercise into classroom activities may have reduced sensitization but did not eliminate it as is discussed more thoroughly in Chapter 4.

While this shortcoming must be recognized, it does not seriously detract from the ability of laboratory experimentation to explain behavior in the organizational setting (Fromkin & Streufert, 1976).

Methods of Data Analysis

Three major statistical methods were used to test hypotheses stated in Chapter 1. In order to facilitate understanding of the way in which techniques were employed, it is appropriate that a brief summary of the data base generated by this experiment be provided.

Data Base. One hundred twenty-four observations were tabulated, each observation corresponding to an individual who participated in the experiment. Random assignment resulted in over thirty observations per cell as indicated in Table 1. Each observation consisted of the following eight data elements which were used in verification of manipulation effectiveness and hypotheses test.

1) Degree of task enrichment present (present or not present)
2) Task approach (team or individual)
3) Satisfaction with task ("Satisfaction with leader" was not used in tests of hypotheses)
4) Productivity (only data from individual approach was used for hypotheses test)
5) Quality of work (same restrictions as productivity)

6) GNS

7) SNS (three distinct measures)

8) MPS (along with separate scores for each core dimension)

Principal statistical technique - ANOVA. Multivariate analysis of variance (ANOVA) was used to determine effectiveness of manipulations and impact of moderating variables on the job enrichment-satisfaction relationship (hypotheses 1.a. through 1.d. and 2.a. through 2.d.). It was assumed that randomality features of the experiment fulfilled the ANOVA requirement of independence between observations.

To verify effectiveness of manipulations, two-way ANOVA with composite MPS scores as the dependent variable and enrichment and task approach as independent variables was performed. If enrichment was found to have a significant main effect, the manipulations used to produce the enrichment dichotomy were considered successful. Since the variation in task approach was not expected to influence enrichment levels, the ideal outcome would have been a significant enrichment main effect, with insignificant task approach and interactive effects. To further explore manipulation effectiveness, two-way analysis of variance was also performed in similar fashion on each core dimension. Again, a significant enrichment main effect indicated success in manipulation of that particular core dimension.

Three-way ANOVA represented the first step in determining the impact of moderating variables on the enrichment-satisfaction relationship. Satisfaction was the dependent variable, while enrichment, task approach, and GNS (or SNS) level were independent variables. A significant interactive effect (in the predicted direction) between variables addressed by a hypothesis furnished support for the hypothesis. If a moderating variable was found to have a significant main effect without a significant interactive effect, its influence on work outcome was considered strong, but consistent throughout all experimental cells. Lack of significance on all counts precluded any conclusions regarding variables addressed.

After analyzing data using three-way ANOVA, a comparison of applicable dependent variable means was performed. For GNS, observations in each of the four primary cells were divided into two categories based on high-low GNS classification discussed earlier in Chapter 3. The mean satisfaction scores of the eight resultant cells were then compared, using the "Least Significant Difference" (LSD)* test, to determine whether the differences between means were statistically significant. If the null hypothesis was rejected, the a-posteriori contrast was able to

*The justification for use of this particular a-posteriori contrast technique follows.

identify divergent means and thus indicate whether specific cell differences were in the direction predicted by the hypothesis. The method employed to measure impact of SNS was identical except that division of observations in the four primary cells was based on a high-low SNS classification.

Test of the overall job enrichment-satisfaction hypothesis (3.a.) also used two-way analysis of variance. Mean satisfaction scores in the primary cells were analyzed without consideration of moderating variables, thus focusing on overall impact of the two independent variables, enrichment and task approach. Multiple Classification Analysis (MCA) was performed to determine the magnitude of the effect of each factor.

Since team productivity and quality scores were excluded from data analysis, two-way analysis of variance was used to determine the interactive impact of enrichment and GNS (or SNS) level on task performance indicators (hypotheses 1.e. through 1.h. and 2.e. through 2.h.). The same criteria test discussed above for the three-way satisfaction ANOVA was used for productivity and quality. Cell stratification by GNS and SNS was again used to isolate applicable performance mean scores and an LSD test again employed to identify divergent means. One-way analysis of variances was used to test overall hypotheses on the enrichment-performance relationships (3.b. and 3.c.).

Justification for the LSD technique. Because of the exploratory nature of this research and its significance for initiating follow-on studies, it was decided to use the a-posteriori contrast technique which maximizes the probability of rejecting the null hypothesis (e.g., "satisfaction scores in all cells are equal") when, in fact, it is false. In other words, the most powerful statistical test was deemed appropriate. This strategy followed the advice of Winer (1972, pp. 12-13) for conducting behavioral science research. Because the "Least Significant Difference" (LSD) a-posteriori contrast technique is the most powerful (Nie, Hull, Jenkins, Steinbrenner & Bent, 1975, p. 427), it was used in statistical tests concerning GNS and SNS.

Another advantage of the LSD test is that it is exact when the number of observations in cells contrasted is unequal. While the research was designed to achieve equal observations in the four contrived work situations, inequalities existed due to use of less-than-ideal class sizes. The LSD technique, however, accommodates imbalance; other techniques (except Scheffe's) do not.

Correlation. While analysis of variance is a powerful statistical tool and by itself sufficient to test hypotheses, the moderating effects of GNS and SNS, along with overall job enrichment impact, were also analyzed, when appropriate, using Pearson product moment correlations. Cells were again divided into two categories based on

levels of GNS and SNS, with correlations run between MPS scores and corresponding values of dependent variables. Fisher's z-transformation tests were performed to determine whether differences between correlation coefficients were significant, and thus, whether the enrichment-work outcome relationship varied according to individual levels of GNS and SNS. Correlation analysis was of greatest value, and thus will be emphasized in Chapter 4, in cases where ANOVA results were not significant at the desired level, but where data indicated a distinct trend. Results of correlation thus were able to confirm the trend, add additional insight into underlying relationships, and furnish further support (or non-support) for hypotheses.

Level of significance. A level of significance of .05 was used in all hypotheses tests, since examination of the literature indicates that .05 is well accepted and most popular in behavioral research. Relationships that hold at more conservative (in terms of Type I error probabilities) alpha levels (e.g., .01) are so indicated in Chapter 4, as are relationships that failed to be significant at the .05 level but met statistical tests at the .1 alpha level. Apparent trends in the data are reported even if not significant at the .1 level. This is standard procedure in the literature, especially in exploratory efforts, and enables a more subjective evaluation of research results by the reader.

Statistical analysis was accomplished with the aid of the Statistical Package for the Social Sciences (SPSS) packaged programs. The Fisher *z* tests were computed manually.

Chapter 4

RESULTS AND ANALYSIS

The laboratory experiment generated a variety of insights into satisfaction and performance under different work conditions. This chapter explores the data base compiled during conduct of the Erector set exercise and is divided into five major sections. First, effectiveness of manipulations in the laboratory experiment is discussed, prefaced by a brief overview of pilot test findings and post-test changes to laboratory manipulations. Second, the overall integrity of the resultant data base is examined, including a summary of informal experimenter observations. The third and fourth sections analyze the moderating effects of GNS and SNS respectively, with the fifth section discussing overall relationships between job enrichment and work outcome. The chapter concludes with a brief synopsis to highlight key points made in the discussion of results.

Effectiveness of Enrichment Manipulations - Pilot Test

Results - MPS. The initial attempt in conducting the laboratory experiment involved 27 students in Maintenance Management Information Systems Class (Number 261E). Manipulations in that session were successful in producing

significantly higher Motivating Potential scores in the "enriched" Erector set task, versus the "unenriched" task. Table 6 presents results of two-way analysis of variance used to determine significance of independent variables (task enrichment and task approach) on MPS.

Table 6

Two-Way Analysis of Variance Showing Effectiveness of Experimental Manipulations - Pilot Test

	df	Mean Square	F	Significance*
Main Effects:				
Enrichment (present or not present)	1	7925.8	8.53	.008
Task Approach (team or individual)	1	596.8	.64	n.s. (.999)
2-way Interaction:				
Enrichment vs. Task Approach	1	1037.9	1.12	n.s. (.302)
Residual	23	929.3		

*Values less than .05 considered significant

Because the "task approach" manipulation was not significant in explaining variance among MPS scores, the conclusion followed that only changes in task core dimensions were responsible for higher MPS scores in enriched cells. Furthermore, the lack of any two-way interaction indicated that enrichment manipulations were equally effective in both team and individual task approach. This result

agrees with the Hackman and Morris (1975) studies which contend that the same enrichment techniques that work for individuals may also be applied successfully to groups.

Results - core dimensions. The primary objective of the experimenters in analyzing pilot test data was to determine whether a change to any of the specific manipulations, indicated in Table 1, was needed in order to strengthen the impact of a particular core dimension on the enrichment dichotomy. Consequently, the Least Significant Difference (LSD) test was employed in conjunction with one-way analysis of variance to determine whether differences between mean values of core dimensions in each of the four experimental cells were in the predicted direction, and if so, whether they were significant. Appendix I gives the results of that analysis.

Nature of and basis for change to manipulations. As indicated by Appendix I, only manipulations involving "task identity" were successful in achieving statistically significant differences between experimental cells. Although not significant, differences in skill variety, autonomy, and feedback were in the desired direction and thus contributed to the ultimate objective of significant differences between MPS scores.

The task significance variable, however, took on higher values in the unenriched cells and therefore slight changes were made to that manipulation. Originally,

instructions to the enriched cells were lavish in their emphasis on the use of Erector construction in university and military research because of its "great facility" for explaining human behavior. Observation, however, indicated that participants found these statements lacking in credibility which may have resulted in an adverse reaction to the task itself. In subsequent replications, therefore, this manipulation was changed to de-emphasize the significance of past research efforts and instead focused on the ability of the task to assist mid-level managers in understanding ingredients of job design.

The only other change to manipulations involved shortening of the run time from forty to thirty minutes. Observations during the pilot test indicated that enriched cell participants started to become bored with Erector model construction during the last ten minutes of allotted time, after having approached it enthusiastically at the onset. The concern of the experimenters was that Erector set construction, regardless of model complexity, would eventually become boring and lose its intended "enriched" nature. Hence a reduction in time to thirty minutes appeared appropriate. Observations in subsequent replications, along with data analysis, confirmed the effectiveness of this manipulation change.

Inclusion of pilot data. Despite minor drawbacks discussed above, the pilot test of the Erector exercise was

highly successful in achieving the enrichment dichotomy desired. For this reason, data collected from participants in that session was merged with data collected during subsequent replications and was used in all hypothesis tests. Because modifications to manipulations were minor, the nature of laboratory activity remained virtually unchanged. The only adjustment made to the data base involved a reduction in 40-minute productivity figures (by a factor of .75) to enable merger with 30-minute figures.

Effectiveness of Enrichment Manipulations - All Observations

Results - MPS. An analysis of all 124 observations from five different classes indicated that manipulations were highly effective in producing significant differences in MPS between enriched and unenriched cells. Table 7 presents the results of two-way analysis of variance used to determine overall significance of independent variables while Table 8 indicates results of an LSD test used to determine differences in MPS means according to experimental cell. Figure 2 plots those means.

In contrast to the pilot test, both enrichment and task approach manipulations had a significant impact on MPS. As evident from Multiple Classification Analysis, however, level of enrichment was the dominant factor. Mean MPS scores dropped 19.6 points from enriched to unenriched cells, while the difference between MPS means according to

Table 7

Two-Way Analysis of Variance Showing Effectiveness of Experimental Manipulations-All Observations

	df	Mean Square	F	Significance
Main Effects:				
Enrichment	1	12101.4	16.98	.001
Task Approach	2	2884.0	4.05	.044
Two-way Interaction:				
Enrichment x Task Approach	1	785.3	1.10	.296
Residual	120	712.7		

Multiple Classification Analysis

MPS Grand Mean: 33.56

Effects of Independent Variables:

a. Enrichment
   present +9.97
   not present -9.65

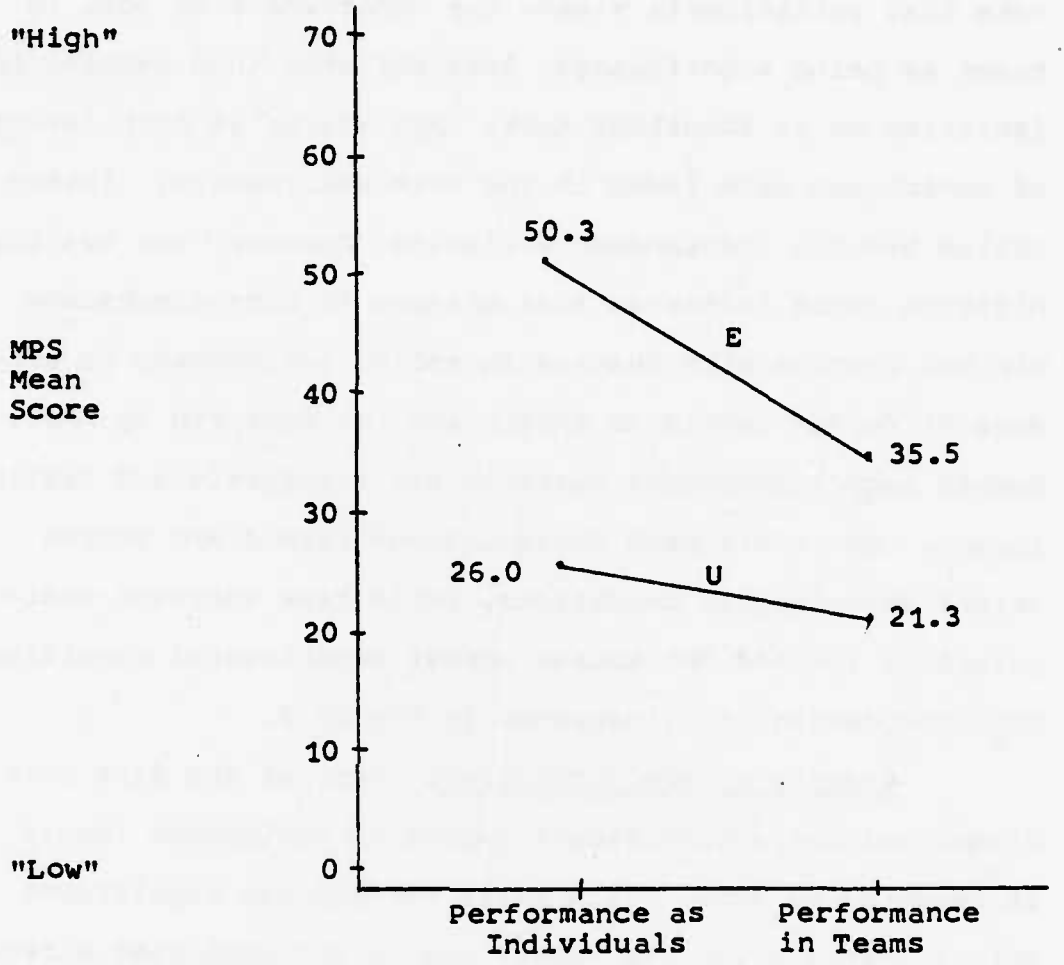
b. Task Approach
   team -5.16
   individual +4.25

Table 8

Results of LSD Test for Significant Differences Between Means

	Experimental Cell						
	1. Enriched Team	2. Unenriched Team	3. Enriched Individual	4. Unenriched Individual	F	Sig	Significantly Different Cells*
Mean MPS score	35.5	21.3	50.3	26.0	7.3	.000	3 > 1 > 4 > 2
MPS Range	3.0-119.0	1.5-58.0	1.5-136.5	2.75-82.5			
MPS Standard Deviation	27.9	17.5	35.0	22.3			

*Any cells not underscored by the same line are significantly different. Any cells underscored by the same line are not significantly different. Alpha significance value is .05.



Key: E = enriched task

U = unenriched task

Figure 2. Three-factor diagram showing impact of enrichment and task approach manipulations on MPS.

task approach was only 9.4 points. It is interesting to note that participants viewed the opportunity to work in teams as being significantly less enriched than working in isolation on an identical task. MPS scores at both levels of enrichment were lower in the team environment. Interaction between independent variables, however, was not significant which indicates that changes to core dimensions did not combine with changes in social environment to produce different levels of enrichment (as measured by MPS). Rather each independent variable had a separate and distinct impact. The enrichment manipulations raised MPS scores across experimental conditions, while task approach manipulations lowered MPS scores across experimental conditions. This phenomenon is illustrated in Figure 2.

Results - core dimensions. Four of the five core dimensions had a significant impact on enrichment levels as measured by MPS. While skill variety was significant only at alpha = .1, its impact was in the predicted direction. Moreover, skill variety was the only core dimension which exhibited a two-way interaction (enrichment x task approach) which approached significance. Table 9 gives results of two-way analysis of variance by core dimensions, while Table 10 compares core dimension means using the LSD contrast. Figures 3 through 7 plot these means.

Results of core dimension ANOVA's generally followed the pattern exhibited by MPS scores discussed above. In

Table 9

Two-Way Analysis of Variance to Show Manipulation Effectiveness by Core Dimension - All Observations

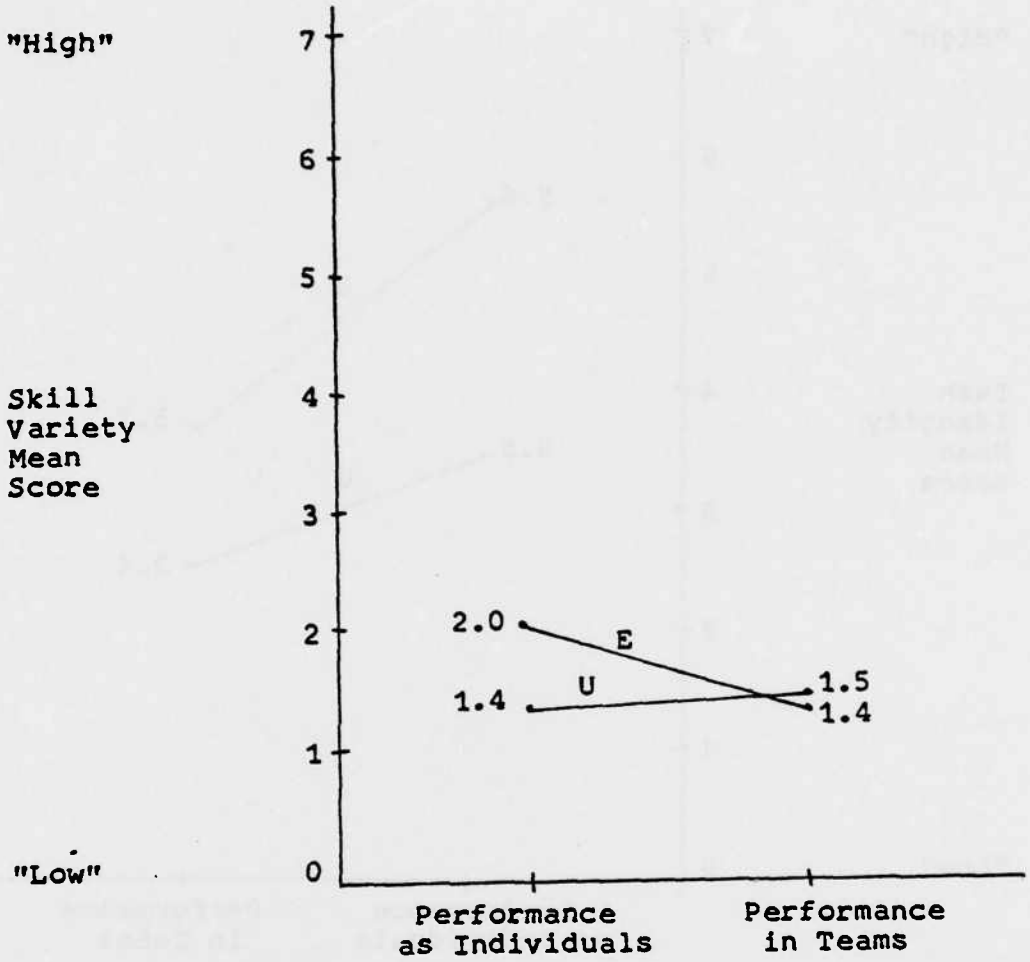
Core Dimension	Main and Interactive Effects	df	Mean Square	F	Significance
Skill Variety	Enrichment	1	2.2	2.66	n.s. (.101)
	Task Approach	1	1.2	1.49	n.s. (.223)
	Enrichment x Task Approach	1	2.9	3.54	n.s. (.059)
	Residual	120	.8		
Task Identity	Enrichment	1	94.3	26.43	.001
	Task Approach	1	72.3	20.26	.001
	Enrichment x Task Approach	1	4.6	1.28	n.s. (.259)
	Residual	120	3.6		
Task Significance	Enrichment	1	11.2	3.95	.047
	Task Approach	1	41.8	14.79	.001
	Enrichment x Task Approach	1	2.8	1.00	n.s. (.999)
	Residual	120	2.8		
Autonomy	Enrichment	1	18.6	5.99	.015
	Task Approach	1	15.4	4.96	.026
	Enrichment x Task Approach	1	3.7	1.20	n.s. (.275)
	Residual	120	3.1		
Feedback	Enrichment	1	26.6	9.61	.003
	Task Approach	1	.02	.007	n.s. (.999)
	Enrichment x Task Approach	1	.07	.025	n.s. (.999)
	Residual	120	2.8		

Table 10

Effectiveness of Enrichment Manipulations by Core Dimension Using the Least Significant Difference (LSD) Test- All Observations

Core Dimension	Experimental Cell - Means 1. Enriched Team	2. Unenriched Team	3. Enriched Individual	4. Unenriched Individual	F	Sig	Significantly Different Cells*
Skill Variety	1.45	1.52	1.96	1.41	2.54	.058	3 > 2 > 1 > 4
Task Identity	3.70	2.38	5.62	3.53	15.77	.000	3 > 1 > 4 > 2
Task Significance	3.93	4.20	2.46	3.33	6.51	.000	2 > 1 > 4 > 3
Autonomy	3.50	3.11	4.56	3.47	4.00	.010	3 > 1 > 4 > 2
Feedback From Job	3.45	2.57	3.47	2.50	3.22	.025	3 > 1 > 2 > 4

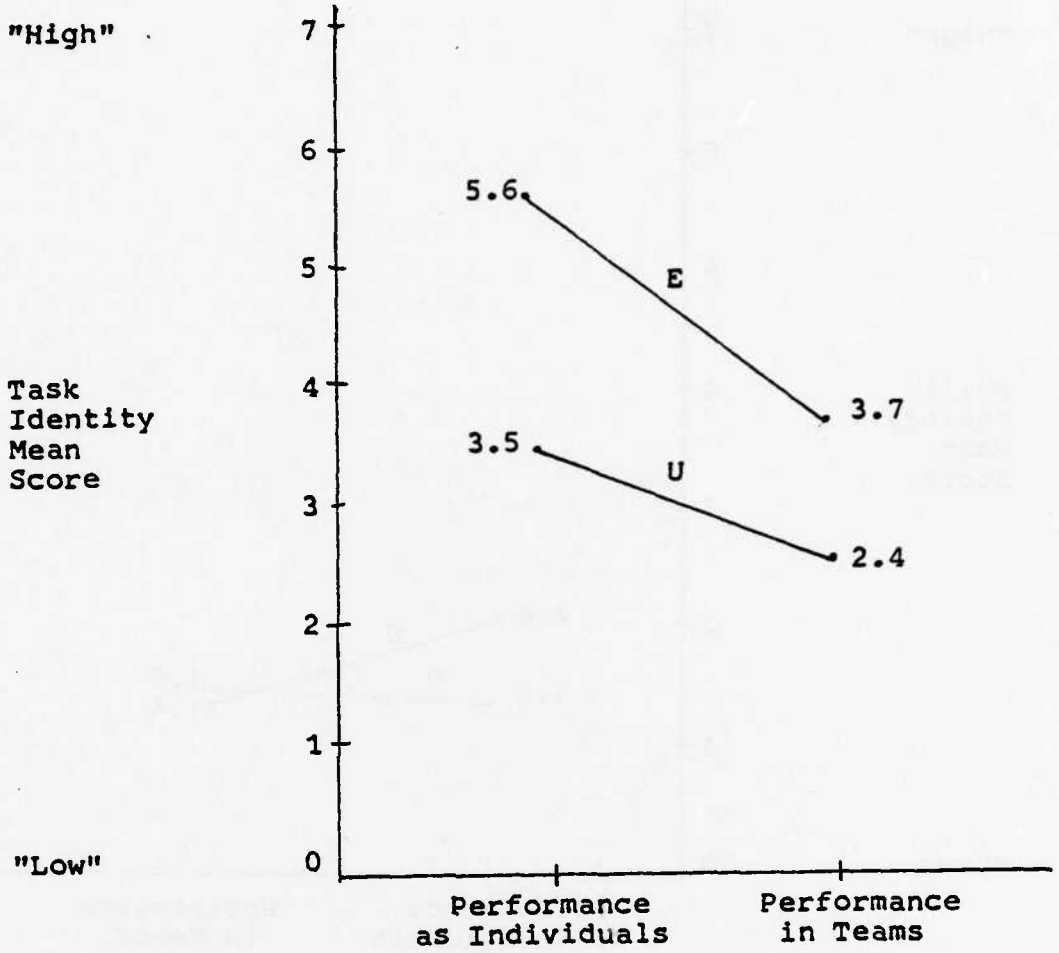
* Any cells not underscored with the same line are significantly different. Those underscored with the same line are not significantly different. Alpha = .05.



Key: E = enriched task

U = unenriched task

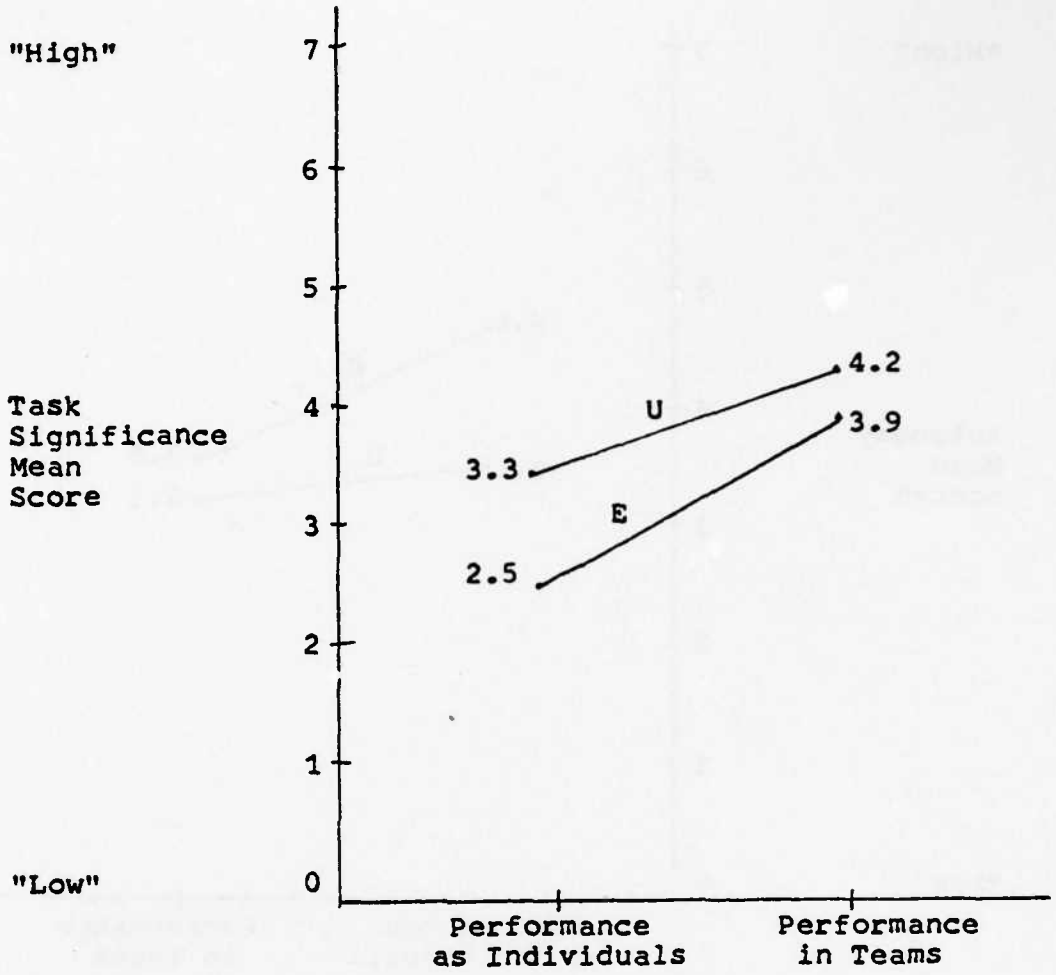
Figure 3. Three-factor diagram showing impact of enrichment and task approach manipulations on the skill variety core dimensions.



Key: E = enriched task

U = unenriched task

Figure 4. Three-factor diagram showing impact of enrichment and task approach manipulations on the task identity core dimension.



Key: E = enriched task

U = unenriched task

Figure 5. Three-factor diagram showing impact of enrichment and task approach manipulations on the task significance core dimension.

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THE IMPACT OF GROWTH AND SOCIAL NEEDS ON THE JOB ENRICHMENT PRO--ETC(U)
SEP 77 D M HORSTMAN, J J KOTZUN

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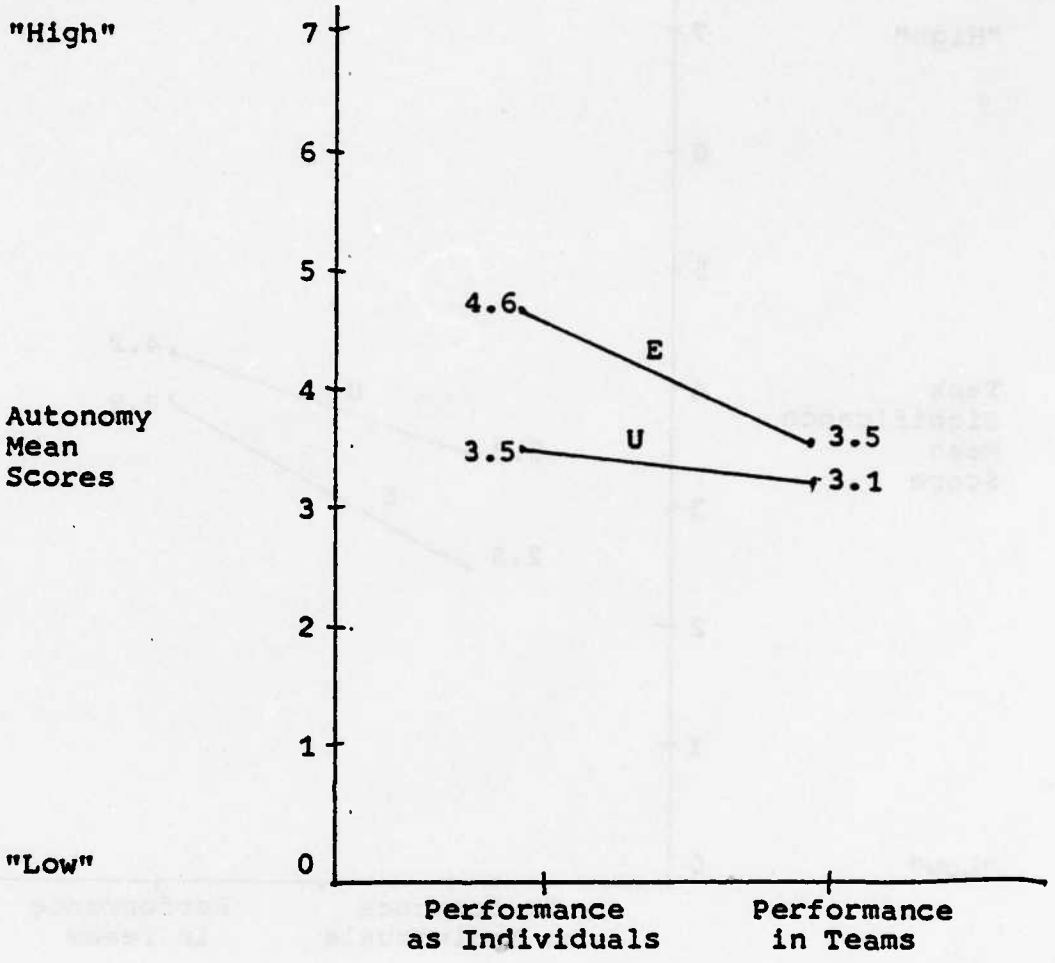
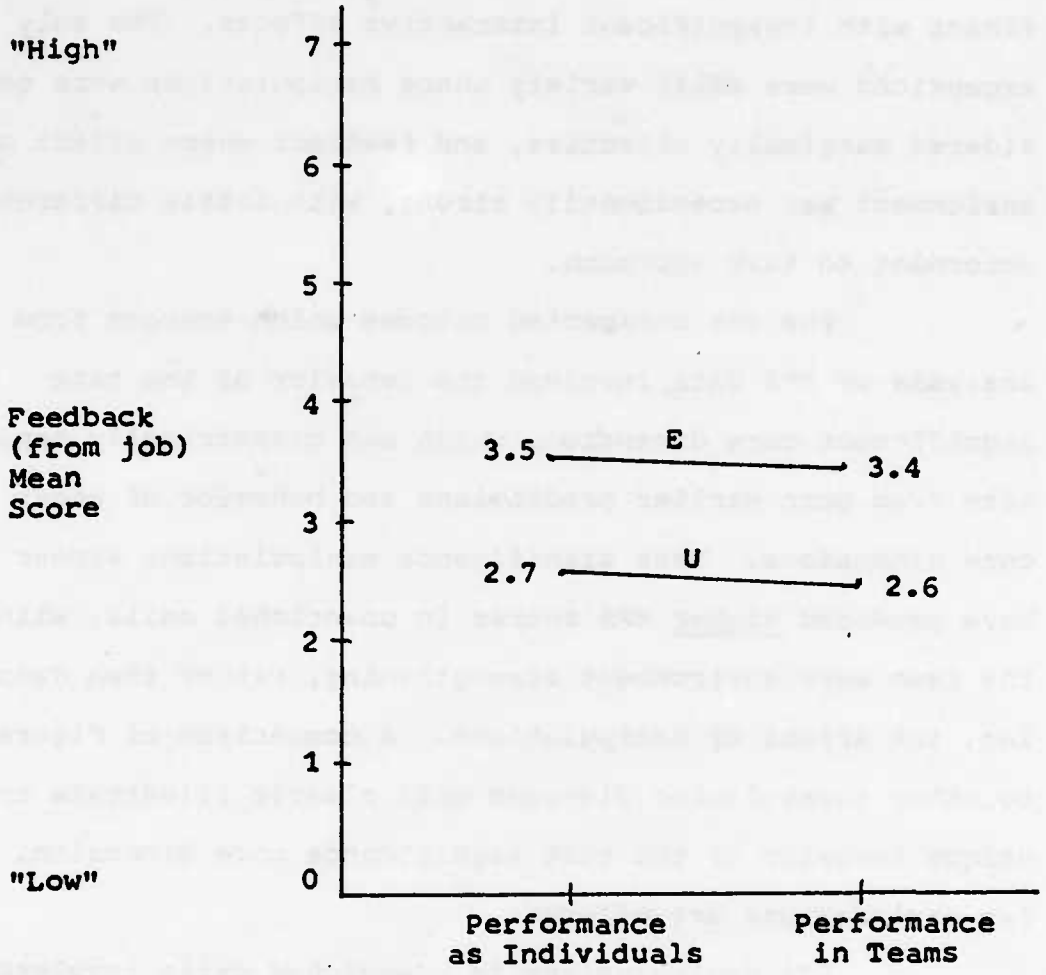


Key: E = enriched task

U = unenriched task

Figure 6. Three-factor diagram showing impact of enrichment and task approach manipulations on the autonomy core dimension.



Key: E = enriched task

U = unenriched task

Figure 7. Three-factor diagram showing impact of enrichment and task approach manipulations on the feedback (from job) core dimension.

most cases, impact of both independent variables was significant with insignificant interactive effects. The only exceptions were skill variety where manipulations were considered marginally effective, and feedback where effect of enrichment was exceptionally strong, with little difference according to task approach.

The one unexpected outcome which emerged from analysis of MPS data involved the behavior of the task significance core dimension, which was diametrically opposite from both earlier predictions and behavior of other core dimensions. Task significance manipulations appear to have produced higher MPS scores in unenriched cells, with the team work environment strengthening, rather than dampening, the effect of manipulations. A comparison of Figure 5 to other three-factor diagrams will clearly illustrate the unique behavior of the task significance core dimension. Two explanations are offered:

(1) Manipulations in unenriched cells involved telling participants that "someone else will finish the model at another time using components you will build now" (See Appendix B). This may have led some participants to answer positively to question 6 of the JDS which measures significance in terms of how other people might be affected by Erector task performance. The team approach would also lead participants to answer positively to question 6 because of the inter-dependency of effort in a group especially

where an assembly line environment prevailed. Analysis of variance indicated the significant reverse effect which enrichment manipulation had on response to question 6, as well as the stronger impact of a team approach. Results are in Table 11.

Table 11

Impact of Enrichment and Task Approach on Response to Question 6 of JDS

	Mean Square	F	Significance
Main Effects:			
Enrichment	21.8	5.51	.02
Task Approach	128.8	32.52	.001
Interactive Effects:			
Enrichment x Task Approach	.98	.25	n.s. (.999)
Residual	3.9		

Multiple Classification Analysis

Question 6 - Grand Mean: 3.92

Mean difference by Category:

a. Enrichment
   - Present: -.40
   - Not present: +.41

b. Task Approach
   - Team: +1.12
   - Individual: -.92

(2) Because of the assembly line layout of the unenriched task, some participants worked under the

impression that the experiment had time and motion, or other scientific management applications. This may have led them to answer positively to question 12 of the JDS which measures significance in terms of how important the task was in the broader scheme of things. Table 12 illustrates the reverse reaction of participants which appears to have been affected, although not significantly, by enrichment manipulations.

Table 12

Impact of Enrichment and Task Approach on Response to Question 12 of the JDS

	Mean Square	F	Significance
Main Effects:			
Enrichment	4.0	1.02	n.s. (.315)
Task Approach	2.5	.64	n.s. (.999)
Interactive Effects:			
Enrichment x Task Approach	5.6	1.42	n.s. (.234)
Residual	3.9		

Multiple Classification Analysis

Question 12 - Grand Mean: 2.94

Mean Difference by Category:

a. Enrichment
   - Present: -.18
   - Not Present: +.18

b. Task Approach
   - Team: +.15
   - Individual: -.13

The contrary behavior of the task significance variable was not strong enough to counteract predicted behavior of other core dimensions. Resultant MPS scores thus achieved significant differences in the desired direction so as to permit hypotheses tests.

Data Base Integrity

Systematic bias in sample? As discussed in Chapter 3, the random selection and assignment principles followed throughout the laboratory experiment were designed to eliminate systematic differences which might exist in the sample. A breakdown of class composition showed that military-civilian ratios and average grade levels were generally equivalent in each replication. The major factor, then, which might have caused a systematic bias in the sample and hence create problems in generalizing results involves the narrow focus of course material and the specialized nature of individuals making up enrollment of each class. Of special concern was the possibility that effects of enrichment manipulations might vary among classes; i.e., that MPS scores in identical cells would show significant differences between replications. Table 13 shows the results of an LSD test used to compare MPS mean scores by experimental cell and replication. While some variation between MPS scores existed between classes, none of the differences were significant. Thus

Table 13

Comparison of Mean MPS Scores by Experimental Cell and Continuing Education Class Using the Least Significant Difference Test

Replication (Class #)	MPS Means by Experimental Cell			
	Enriched Team	Unenriched Team	Enriched Individual	Unenriched Individual
1. 261E Maintenance Info Systems	31.2	16.0	54.9	12.5
2. 224E Logistics Management	33.4	23.7	57.1	23.1
3. 345C Quantitative Analysis	46.5	24.0	38.8	34.3
4. 370C Defense Data Management	27.4	11.6	48.4	33.1
5. 131C Industrial Maintenance	38.3	25.0	48.9	24.4
F	.262	.500	.208	1.798
Significance*	n.s. (.898)	n.s. (.733)	n.s. (.930)	n.s. (.154)
Significantly Different Means	none	none	none	none

*Values less than .05 considered significant

the random features of the experiment were successful in achieving similar manipulation results in each replication. This feature is critical if conclusions generated by this research effort are to be generalized to the population designated in Chapter 3.

Informal experimenter observations. The Erector set experiment, as an exercise in human behavior, naturally evoked varying reactions and interpretations among participants. In order to present all possible factors which might impact on data collected and hence conclusions generated, it is considered appropriate to summarize impressions gleaned by observation. While impossible to subject such impressions to quantitative analysis, they may assist in explaining findings discussed in later sections.

A certain degree of hostility was encountered when the experiment was conducted, especially when its placement in the course schedule appeared to interfere with prior activities or personal plans. This was especially noticeable when the experiment was done at the end of the day or as the last topic in the course (just prior to graduation). The inability to obtain any knowledge or personal gratification from the experiment also caused outward manifestation of anxiety, especially in the team environment where conversation between members sometimes reinforced negative reactions.

Sensitization of participants occurred in varying

degrees and was often bolstered by the class instructor's comments just prior to introduction of experimenters. Extremes existed but did not appear to affect manipulation effectiveness. In one class, participants were told that they would be "turned into guinea pigs for a grad log thesis project", while other course instructors simply referred to the Erector task as a "learning exercise in job design".

A factor which appeared to affect performance was the overall competitive nature of the classroom environment. The charge to "build as many models/components until time is called" was the overriding concern of many participants, some of whom inquired as to impact of their Erector performance on course grade. The competition was especially noticeable when more than one team existed in the enriched-team cell. Rather than experiment in building a variety of models, teams invariably chose to construct that model perceived as least difficult (the stock-cart) in order to achieve maximum production. In some cases, enriched teams spontaneously broke "whole" model construction into simpler elements, forming an assembly line with each member repeating certain nut and bolt connections. What had been planned as an enriched task by experimenters, thus took on "unenriched" characteristics. This could partially explain the lower MPS mean in the enriched-team cell, compared to that in the enriched-individual cell where task manipulations were nearly identical.

In teams having one or more women, however, competition appeared less serious and a measure of levity among participants became evident. Because of the few women participating in the study, however, no effects of sex could be isolated. Observations disclosed no apparent effects of other demographic variables such as rank, military vs. civilian, or career background.

Hypothesis Tests - GNS

This section first discusses overall moderating impact of GNS on the job enrichment-work outcome relationships and then discusses specific hypotheses made in Chapter 1 in order of their appearance there.

Overall impact of GNS on satisfaction. Individual levels of growth need strength had a significant impact on overall satisfaction with the Erector set task. Table 14 presents results of the three-way ANOVA used to determine the simultaneous impact of three variables (enrichment, task approach, and GNS) on task satisfaction. Because task approach was not significant, the ANOVA was collapsed to a two-way analysis, with enrichment and GNS retaining their significance. Interactive effects were not significant which would give a preliminary indication that no relationship exists between enrichment and GNS in producing increased satisfaction.

Multiple classification analysis in conjuntion with

Table 14

Three-Way Analysis of Variance Showing Impact of Enrichment, Task Approach and GNS on Satisfaction with the Erector Task

	df	Mean Square	F	Significance
Main Effects:				
Enrichment (Enr)	1	832.9	8.39	.005
Approach (App)	1	25.6	.26	n.s.(.999)
GNS	1	600.2	6.05	.016
2-way Interaction:				
Enr x App	1	20.6	.21	n.s.(.999)
Enr x GNS	1	59.5	.60	n.s.(.999)
App x GNS	1	10.9	.11	n.s.(.999)
3-way Interaction:				
Enr x App x GNS	1	13.8	.14	n.s.(.999)
Residual	69	99.3		

Multiple Classification Analysis

Satisfaction Grand Mean: 14.97

Effects of Independent Variables:

a. Enrichment
   - present +3.25
   - not present -3.70

b. Approach
   - team -.91 (n.s.)
   - individual +.65 (n.s.)

c. GNS
   - high -3.00
   - low +3.24

Table 14 (cont)

Collapse of Three-Way ANOVA to Eliminate Non-Significant Main Effect (Task Approach)

	df	Mean Square	F	Significance
Main Effects:				
Enrichment (Enr)	1	818.4	8.62	.005
GNS	1	643.4	6.77	.011
2-way Interaction:				
Enr x GNS	1	35.6	.37	n.s. (.999)
Residual	73	95.0		

Multiple Classification Analysis

Satisfaction Grand Mean: 14.97

Effects of Significant Independent Variables:

a. Enrichment
   present +3.25
   not present -3.70

b. GNS
   high -3.00
   low +3.24

ANOVA indicated that low GNS individuals were more satisfied, regardless of enrichment condition. A 6.2 point difference in satisfaction means existed between high and low GNS groups. Given the significant overall impact of GNS on satisfaction in the Erector experiment, an LSD test was employed to make specific comparisons between experimental cell satisfaction means as stratified by high-low GNS. It is this test on which resolution of hypotheses concerning GNS and satisfaction is based. Results are shown in Table 15 and Figure 8.

Effect of GNS on satisfaction - enriched task. Hypotheses 1.a. and 1.b. address the moderating impact of GNS on satisfaction in enriched jobs and are restated below.

1.a. High GNS individuals working as a team on an enriched task will have a higher level of satisfaction than low GNS individuals working as a team on an enriched task.

1.b. High GNS individuals working alone on an enriched task will have a higher level of satisfaction than low GNS individuals working alone on an enriched task.

As can be seen in Figure 8, data generated by this experiment does not support either hypothesis. In fact, the difference between mean satisfaction scores is in the reverse direction, although it is not significant. Since level of enrichment had a significant impact on satisfaction according to the Table 14 ANOVA, it appears that satisfaction is higher in enriched tasks regardless of GNS levels.

Table 15

Comparison of Mean Satisfaction Scores in Experimental Cells Stratified According to GNS Levels - Using the LSD Test

	GNS					
	High (>6.33)			Low (<5.33)		
	Cell No.	No. Cases	Mean Satisfaction Score	Cell No.	No. Cases	Mean Satisfaction Score
Enriched Team	1	12	14.25	2	6	19.83
Unenriched Team	3	7	7.86	4	7	15.00
Enriched Individual	5	8	18.38	6	15	20.67
Unenriched Individual	7	13	8.15	8	9	15.56

F Ratio: 2.431

Significance: .027

Significantly Different Cells:*

6 > 2 > 5 > 4 > 8 > 1 > 7 > 3

*Any cells not underscored by the same line are significantly different. Those cells underscored by the same line are not significantly different. Alpha = .05.

	Team Performance	Individual Performance
Enriched	High GNS - Cell 1 No. Cases: 12 Mean Score: 14.25	High GNS - Cell 5 No. Cases: 8 Mean Score: 18.38
	Low GNS - Cell 2 No. Cases: 6 Mean Score: 19.83	Low GNS - Cell 6 No. Cases: 15 Mean Score: 20.67
Unenriched	High GNS - Cell 3 No. Cases: 7 Mean Score: 7.86	High GNS - Cell 7 No. Cases: 13 Mean Score: 8.15
	Low GNS - Cell 4 No. Cases: 8 Mean Score: 15.00	Low GNS - Cell 8 No. Cases: 9 Mean Score: 15.56

F Ratio: 2.431

Significance: .027

Significantly Different Cells:*

6 2 5 4 8 1 7 3

*Any cells not underscored by the same line are significantly different. Those cells underscored by the same line are not significantly different. Alpha = .05.

Figure 8. Comparison of mean satisfaction scores in experimental cells stratified according to GNS levels - using the LSD test.

Effect of GNS on satisfaction - unenriched tasks. Hypotheses 1.c. and 1.d. explore a similar relationship, but in tasks which are unenriched. The hypotheses are restated below.

1.c. High GNS individuals working as a team on an unenriched task will have a lower level of satisfaction than low GNS individuals working as a team on an unenriched task.

1.d. High GNS individuals working alone on an unenriched task will have a lower level of satisfaction than low GNS individuals working alone on an unenriched task.

As indicated on Figure 8, data behaves in the direction predicted by these hypotheses although differences are not significant. In both team and individual unenriched cells, low GNS individuals had higher mean satisfaction scores (almost twice as high) than did corresponding high GNS individuals. The small number of observations in each cell caused by the high-low GNS cutoff technique coupled with an 8-way stratification, however, prevented this difference from being significant. The LSD test indicated that the only significant differences in means existed between HI GNS - unenriched cells and LO GNS - enriched cells which does not address either hypothesis.

Conclusion - GNS, enrichment and satisfaction. Because of the appraent inconsistency between results of hypotheses tests involving the GNS-enrichment, satisfaction relationship, no definitive statement on the moderating effect of GNS can be made. If another approach is taken,

however, the inconsistency seems to be resolved. Regardless of experimental cell, Erector task MPS mean scores were well below the mean of 128.3 calculated by Hackman & Oldham (1975, p. 165) after a review of 658 jobs throughout the United States. When compared to this mean, the Erector task, even with enrichment manipulations, is relatively unenriched (Mean MPS was 50.3 in enriched individual cell, 35.5 in enriched team cell). If the Erector task is thus considered an unenriched job, the moderating impact of GNS shown on the Table 13 ANOVA, agrees with predictions of the literature. That is, low GNS individuals were significantly more satisfied with the Erector task, regardless of manipulations involving that task. High GNS individuals were significantly less satisfied, on an overall basis.

Effect of GNS and enrichment on productivity. As discussed in Chapter 3, only productivity scores in individual task approach cells could be used to measure the GNS-enrichment-productivity relationships. Applicable hypotheses 1.e. and 1.f. are restated below.

> 1.e. High GNS individuals working in an enriched job will have a higher level of productivity than low GNS individuals working in an enriched job.
>
> 1.f. High GNS individuals working in an unenriched job will have a lower level of productivity than low GNS individuals working in an unenriched job.

No support was found for either hypothesis. As indicated by Table 16, the enrichment manipulations were

Table 16

Two-way Analysis of Variance Showing Impact of Enrichment and GNS on Productivity

	df	Mean Square	F	Significance
Main Effects:				
Enrichment	1	3323.6	22.93	.001
GNS	1	1.1	.01	n.s. (.999)
2-way Interaction:				
Enr x GNS	1	13.8	.10	n.s. (.999)
Residual	41	144.9		

Multiple Classification Analysis

Productivity Grand Mean: 37.59

Effect of Independent Variables:

a. Enrichment
   present -8.63
   not present +9.02

b. GNS
   high +2.13 (n.s.)
   low -1.87 (n.s.)

significant in affecting productivity levels, but GNS impact was far from significant. No interactive effects were found. Because of the extremely low value of F in the two-way analysis of variance using enrichment and GNS as independent variables, use of the LSD test to determine differences among productivity means in experimental cells stratified by GNS was considered inappropriate.

Effect of GNS and enrichment on work quality.

Hypothesis 1.g. High GNS individuals working in an enriched job will have a higher level of work quality than low GNS individuals working in an enriched job.

Hypothesis 1.h. High GNS individuals working in an unenriched job will have a lower level of work quality than low GNS individuals working in an unenriched job.

Two-way analysis of variance using GNS and enrichment as independent variables showed that neither, in isolation, had a significant impact on work quality. F-statistics for both main effects were exceedingly low as seen in Table 17. Low mean square values reflect the small variance in quality scores throughout the sample which may explain the inability to isolate any significant relationships involving the quality dependent variable. While quality ratings could theoretically range from zero to 30, actual data was heavily skewed right, with a mean of 27.6 and standard deviation 2.3.

The Table 17 ANOVA results, however, did disclose the possibility of an interactive effect developing between

Table 17

Two-way Analysis of Variance Showing Impact of Enrichment and GNS on Work Quality

	df	Mean Square	F	Significance
Main Effects:				
Enrichment	1	5.3	1.07	n.s. (.309)
GNS	1	.2	.05	n.s. (.999)
2-way Interaction:				
Enr x GNS	1	7.1	1.43	n.s. (.236)
Residual	41	4.9		

Multiple Classification Analysis

Quality Grand Mean: 27.72

Effect of Independent Variables:

a. Enrichment		
	present	-.33 (n.s.)
	not present	+.34 (n.s.)
b. GNS		
	high	-.01 (n.s.)
	low	+.01 (n.s.)

enrichment and GNS levels. While the F-ratio of 1.43 for the interactive effect was low (significant only at alpha = .236), the exploratory nature of this research called for additional examination of raw data. A simple comparison of means was considered the appropriate heuristic technique. Mean quality scores in each enrichment level were stratified according to GNS levels and compared. Results are shown in Figure 9. Although not significant, an interactive trend in the direction predicted by the hypotheses can be observed in the three-factor diagram. It appears that work quality for high GNS individuals was slightly higher than that of low GNS individuals in the enriched version of the Erector task (mean of 27.8 versus 27.2). Conversely, the mean quality for high GNS individuals was slightly lower in the unenriched cell (mean of 27.7 versus 18.6).

Because of the weakness of this support, however, correlation analysis was employed to further explore the interactive trend if, in fact, one existed. MPS and quality were correlated according to enrichment and GNS levels, with Fisher's z scores calculated to determine significance of correlation differences. Results are shown in Table 18. No additional support for hypotheses was obtained, although the interactive trend can again be discerned. The correlation coefficient for high GNS individuals was greater (than that of low GNS individuals) under enriched conditions, and less under unenriched conditions. Results of an overall

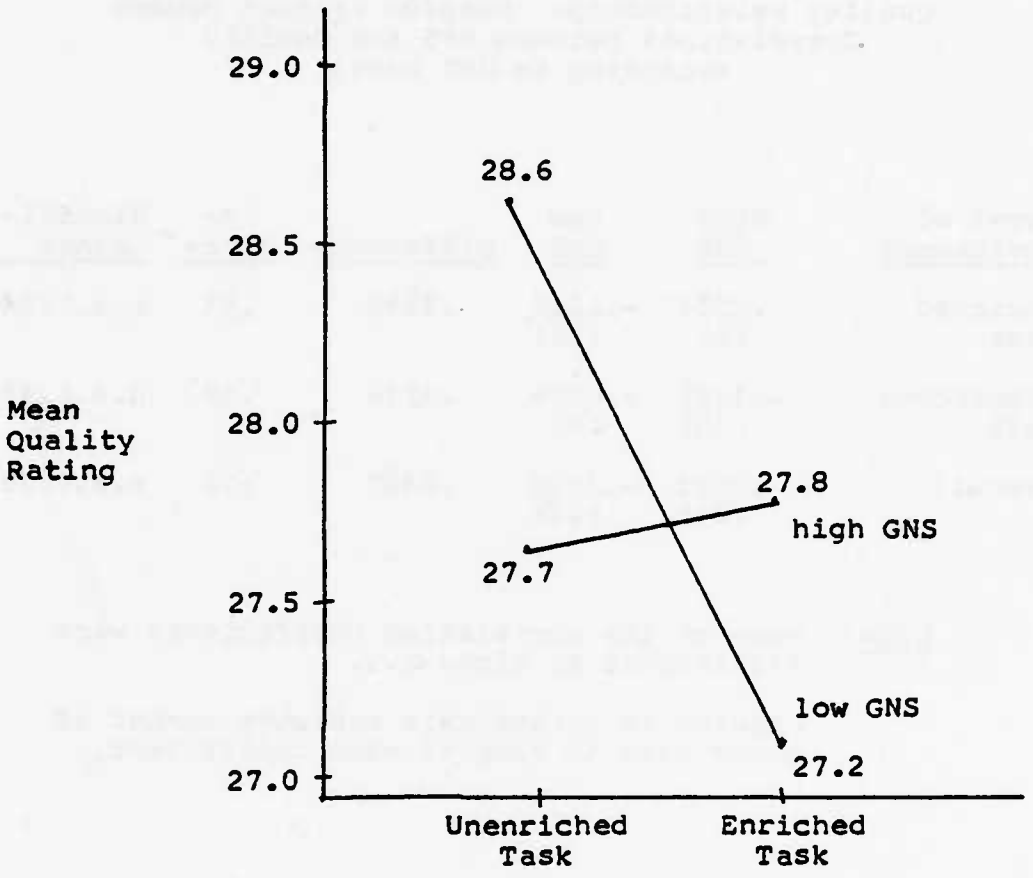


Figure 9. Three-factor diagram showing interactive effect of GNS and enrichment on quality of work.

Table 18

Moderating Effect of GNS on the Enrichment-Work Quality Relationship: Pearson Product Moment Correlations between MPS and Quality according to GNS Level

Level of Enrichment	High GNS	Low GNS	Difference	z-Score	Significance
Enriched Task	.1024 (8)	-.2215 (15)	.3239	.61	n.s.(.27)
Unenriched Task	-.1492 (13)	-.0556 (9)	.0936	.18	n.s.(.43)
Overall	.0021 (21)	-.2379 (24)	.2400	.75	n.s.(.23)

Note: None of the correlation coefficients were significant at alpha < .1.

Figures in parenthesis indicate number of cases used to compute each coefficient.

correlation without stratification by contrived enrichment levels showed a positive coefficient for high GNS individuals, and a negative coefficient for low GNS individuals. Because correlations did not attain desired levels of significance, however, no firm conclusions on the GNS-enrichment-quality relationship can be drawn.

Hypotheses Tests - SNS

This section follows the same general format of the preceding section on GNS. The unique problem concerning SNS measurement encountered by this research, however, brings additional complexity to the discussion of corresponding hypotheses. Because no single proven measurement instrument exists to coincide precisely with the definition of SNS put forth in Chapter 2, three different SNS measures were used. Each participant was assigned three SNS scores based on responses to the GNS-SNS questionnaire found in Appendix G. Hence all statistical tests involving hypotheses were performed three times. In certain cases, the Steers SNS measure taken from the MNQ appeared to bring additional understanding to relationships addressed, while in other cases, the Schutz FIRO-B or the reformated Steers questions resulted in significant findings. In addition to examining the moderating effect of SNS then, this research also brings additional insight to the concept of SNS and its measurement.

Overall impact of SNS on satisfaction. None of the

three SNS measurement instruments showed SNS to have a significant effect, by itself, on satisfaction in the presence of enrichment and team approach manipulations. Use of the Steer's instrument, however, disclosed a strong interactive effect between task approach and social need strength levels. Results of the three-way analysis of variance are shown in Table 19. It will be noted that the only two-way interaction which is significant at alpha $< .05$ is that between task approach and level of SNS. Furthermore, the three-way interaction, enrichment-approach-SNS, is not significant. The results thus indicate that a combination of high SNS and a team approach increased satisfaction regardless of enrichment levels. Conversely, a combination of low SNS and an individual approach results in higher satisfaction. The interactive results follow the prediction of the literature which indicate that a team approach to work will be more satisfying to individuals with high needs for interpersonal relationships. Hypotheses which address these predictions will now be examined in detail.

Interactive effect of SNS and approach in an enriched task.

Hypothesis 2.a. High SNS individuals working as a team on an enriched task will have a higher level of satisfaction than low SNS individuals working as a team on an enriched task.

Hypothesis 2.b. High SNS individuals working alone on an enriched task will have a lower level of satisfaction than low SNS individuals working alone on an enriched task.

Table 19

Three-way Analysis of Variance Showing Effect of Enrichment, Task Approach, and SNS on the Satisfaction Dependent Variable

	df	Mean Square	F	Significance
Main Effects:				
Enrichment	1	545.9	5.93	.017
Task Approach	1	169.2	1.84	n.s.(.177)
SNS	1	60.5	.66	n.s.(.999)
2-way Interaction:				
Enr x App	1	106.5	1.16	n.s.(.286)
Enr x SNS	1	5.3	.06	n.s.(.999)
SNS x App	1	368.0	4.00	.047
3-way Interaction:				
Enr x App x SNS	1	64.3	.70	n.s.(.999)
Residual	62	92.1		

Multiple Classification Analysis

Satisfaction Grand Mean: 14.41

Effects of Independent Variables:

a. Enrichment
   present +2.87
   not present -2.87

b. Task Approach
   team -1.85 (n.s.)
   individual +2.07 (n.s.)

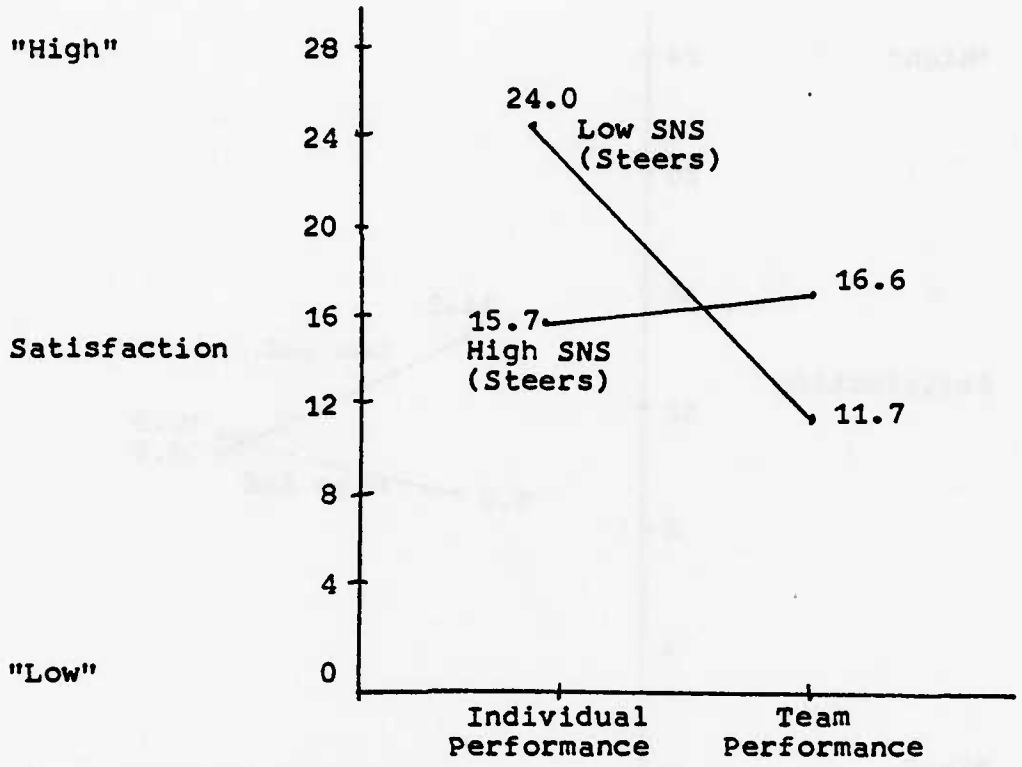
c. SNS
   high -.93 (n.s.)
   low +.93 (n.s.)

Strong support was found for both hypotheses using SNS scores generated from the Steers instrument. Use of other instruments did not provide as strong support for these hypotheses. Figure 10 illustrates the interactive effect of approach and SNS on satisfaction with the Erector task. Results of LSD test used to compare means plotted are also provided on Figure 10. Significant differences were found in the directions predicted by hypotheses 2.a. and 2.b. When the Erector task was approached as a team project, high SNS individuals were significantly more satisfied than low SNS individuals (JDI mean of 16.6 versus 11.7). When work was done in isolation, low SNS individuals were significantly more satisfied (24.0 versus 15.7).

Interactive effect of SNS and approach in an unenriched task.

> Hypothesis 2.c. High SNS individuals working as a team on an unenriched task will have a higher level of satisfaction than low SNS individuals working as a team on an unenriched task.
>
> Hypothesis 2.d. High SNS individuals working alone on an unenriched task will have a lower level of satisfaction than low SNS individuals working alone on an unenriched task.

Although both of these hypotheses found support in data generated from the laboratory experiment, the differences between satisfaction means in unenriched cells as stratified by SNS were not significant. Figure 11 illustrates the interactive effects and presents results of the LSD contrast employed. Although all means are theoretically



LSD Test Results

F Ratio: 2.081

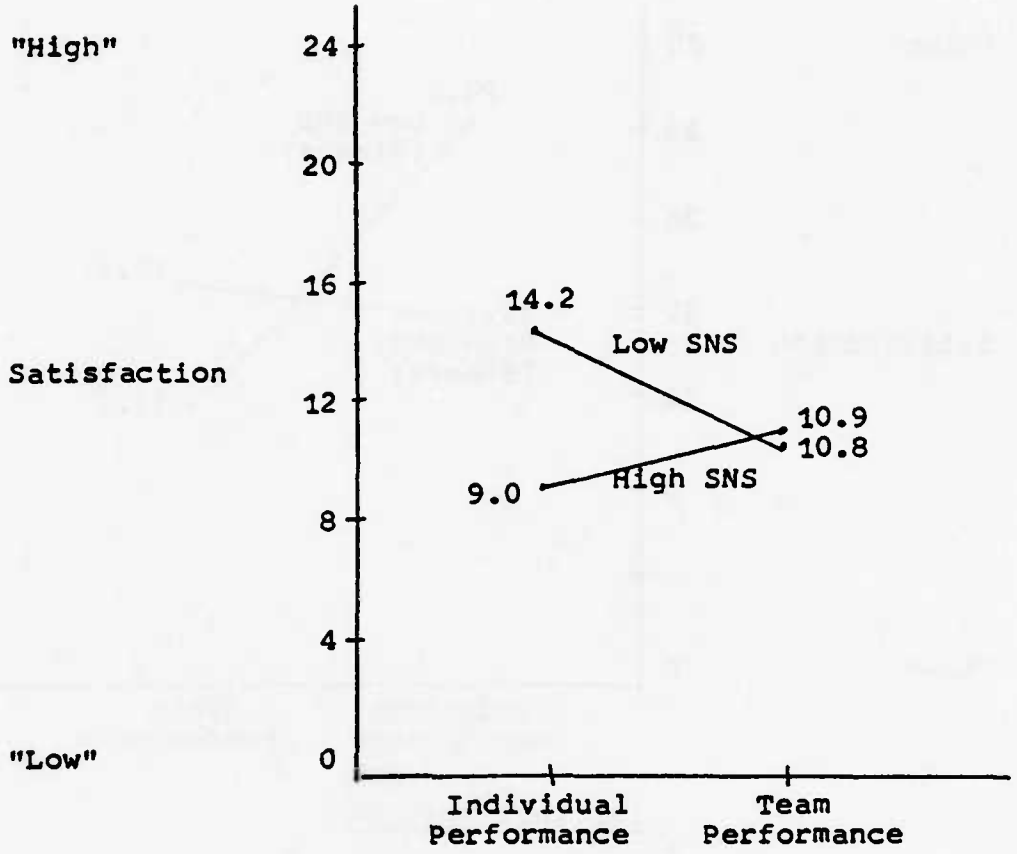
Significance: .058

Significantly different means:*

24.0 > 16.6 > 15.7 > 11.7

*Those means not underscored by the same line are significantly different. Means underscored by the same line are not significantly different. Alpha = .05.

Figure 10. Interactive impact of SNS and task approach on job satisfaction in an enriched task environment.



LSD Test Results

F Ratio: 2.081

Significance: .058

Significantly different means: none

Figure 11. Interactive impact of SNS and task approach on mean job satisfaction scores in an unenriched task environment using Steer's MNQ.

equivalent according to the LSD test, the differences are in the direction predicted by the hypotheses. In a team situation, high SNS individuals were slightly more satisfied than low SNS individuals (10.9 versus 10.8), while low SNS individuals were more satisfied when working alone (14.2 versus 9.0).

Summary - SNS and satisfaction. The three-way ANOVA presented in Table 19 at the beginning of this section provides the clearest summary of experimental results. Only the enrichment main effect was significant which supports the overall hypothesis concerning enrichment and satisfaction discussed later in this chapter. As a main effect, neither task approach nor SNS was significant; however, in combination they did exert a significant impact on satisfaction. This finding supports both predictions of the literature examined in Chapter 2 and hypotheses set forth in Chapter 1. It also lends credibility to Steers' Manifest Needs Questionnaire (MNQ) as a valid indicator of SNS, since it was the use of that instrument which successfully isolated the predicted interactive effect.

In addition, results of analysis emphasize the neutrality of enrichment level on the combinations of SNS and task approach as shown by the insignificant three-way interaction. In other words, the interaction of SNS and task approach appears to have an impact on satisfaction regardless of the level of enrichment present in a job. In

this research, the impact was found to be stronger with the enriched version of the Erector task than in the unenriched version, but this could be caused by the low number of observations (70) which were stratified into eight cells, according to enrichment levels, task approach, and SNS levels.

Effect of SNS and enrichment on productivity.

Hypothesis 2.e. High SNS individuals working in an enriched job will have a higher level of productivity than low SNS individuals working in an enriched job.

Hypothesis 2.f. High SNS individuals working in an unenriched job will have a lower level of productivity than low SNS individuals working in an unenriched job.

Neither the Steers or Schutz SNS measures found any support for hypotheses concerning productivity. The reformated Steers questionnaire (merged with the Hackman-Oldham GNS instrument) however, provided an SNS index which was independently significant in affecting productivity levels. Table 20 presents the results of the two-way ANOVA, with both main effects (enrichment and SNS) having a strong impact on the productivity independent variable. Interactive effects are not significant, which indicates that low SNS individuals are more productive regardless of enrichment levels. Multiple Classification Analysis performed in conjunction with the two-way ANOVA disclosed that low SNS individuals had a mean productivity score which was 10.6 points higher than high SNS

Table 20

Two-Way Analysis of Variance Showing Effect of Enrichment and SNS on Productivity* (using Reformated Steers Instrument)

	df	Mean Square	F	Significance
Main Effects:				
Enrichment	1	2893.8	29.79	.001
SNS	1	690.8	7.11	.011
2-way Interaction:				
Enr x SNS	1	93.3	.96	n.s.(.999)
Residual	37	97.1		

*Productivity scores in the Team performance cells are not included in this analysis.

Multiple Classification Analysis

Productivity Grand Mean: 40.68

Effects of Independent Variables:

a. Enrichment
   present -8.78
   not present +9.22

b. SNS
   high -6.21
   low +4.40

individuals across enrichment conditions.

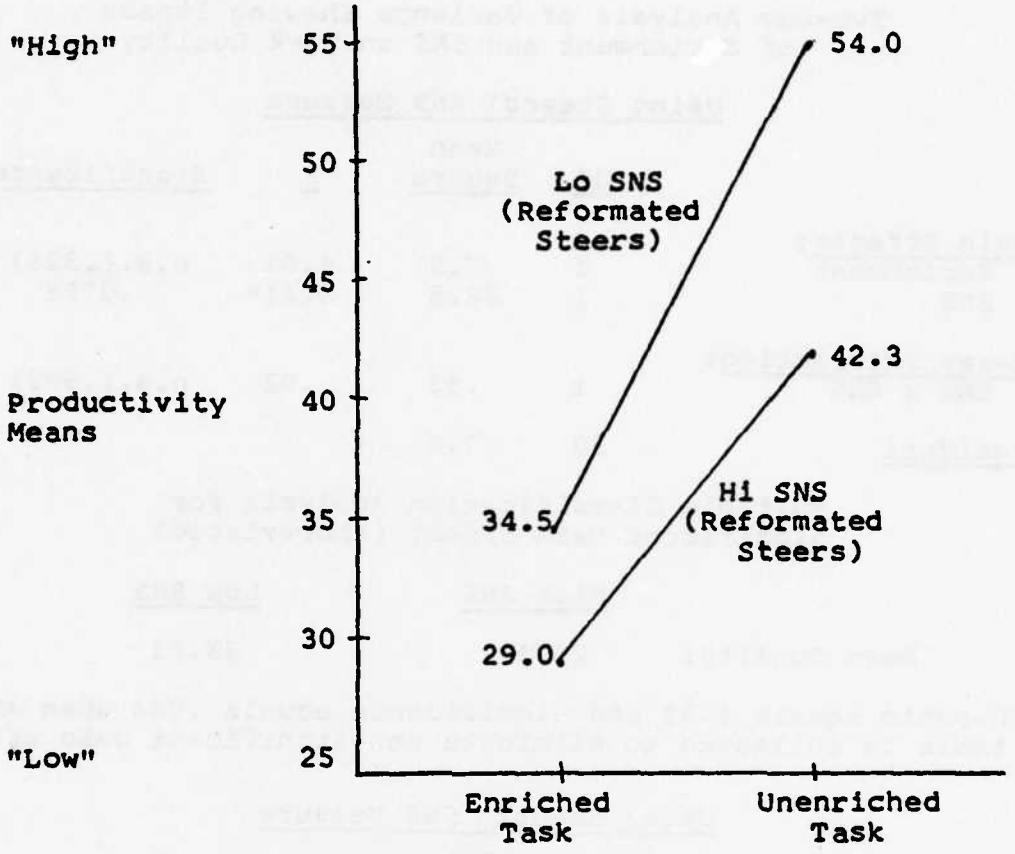
This analysis, along with results of the LSD test shown in Figure 12, strongly supports Hypothesis 2.f.; however, it offers strong opposition to Hypothesis 2.e. The predicted interactive effect did not occur. If the Erector task, however, is again considered an "unenriched job", regardless of the enrichment manipulations, results of the ANOVA become easier to explain. The higher productivity scores of low SNS individuals across laboratory enrichment manipulations follows predictions of the literature as summarized in hypothesis 2.f. No conclusions, however, can be drawn concerning the moderating effect of SNS on productivity in enriched tasks.

Effect of SNS and enrichment on work quality.

Hypothesis 2.g. High SNS individuals working in an enriched job will have a higher level of work quality than low SNS individuals working in an enriched job.

Hypothesis 2.h. High SNS individuals working in an unenriched job will have a lower level of work quality than low SNS individuals working in an unenriched job.

Little support was found for these predictions. Although SNS itself had a significant impact on work quality, the interactive effect between SNS and enrichment level did not materialize as hypothesized. Both the Steers' (at alpha = .07) and Schutz' (at alpha = .04) measures of social need strength produced a significant main effect on the quality dependent variable. Table 21 presents results



LSD Test Results

F Ratio: 14.089

Significance: .0001

Significantly different means:*

54.0 > 42.3 > 34.5 > 29.0

*Any means not underscored by the same line are significantly different. Those means underscored by the same line are not significantly different. Alpha = .05.

Figure 12. Impact of SNS on productivity levels in enriched and unenriched jobs (using Reformated Steers instrument).

Table 21

Two-way Analysis of Variance Showing Impact of Enrichment and SNS on Work Quality

Using Steers' SNS Measure

	df	Mean Square	F	Significance
Main Effects:				
Enrichment	1	7.9	1.01	n.s.(.326)
SNS	1	26.8	3.41*	.072*
2-way Interaction:				
Enr x SNS	1	.13	.02	n.s.(.999)
Residual	30	7.6		

Multiple Classification Analysis for Significant Main Effect (Abbreviated)

	High SNS	Low SNS
Mean Quality:	26.19	28.21

*F-ratio equals 4.31 and significance equals .044 when ANOVA table is collapsed to eliminate non-significant main effect.

Using Schutz' SNS Measure

	df	Mean Square	F	Significance
Main Effects:				
Enrichment	1	4.2	1.15	n.s.(.292)
SNS	1	16.2	4.38*	.042*
2-way Interaction:				
Enr x SNS	1	.01	.000	n.s.(.999)
Residual	34	3.6		

Multiple Classification Analysis for Significant Main Effect (Abbreviated)

	High SNS	Low SNS
Mean Quality:	27.08	28.30

*F-ratio equals 3.80 and significance equals .056 when ANOVA table is collapsed to eliminate non-significant main effect.

of the two-way analysis of variance. The significant main effect of SNS is retained in both cases when the ANOVA is collapsed to eliminate the non-significant enrichment variable.

As can be seen in Figure 13, the behavior of the quality variable is similar to that of productivity discussed in the preceding section. Quality means were higher among low SNS individuals regardless of enrichment condition. Results of the LSD contrast between means are given in Figure 13.

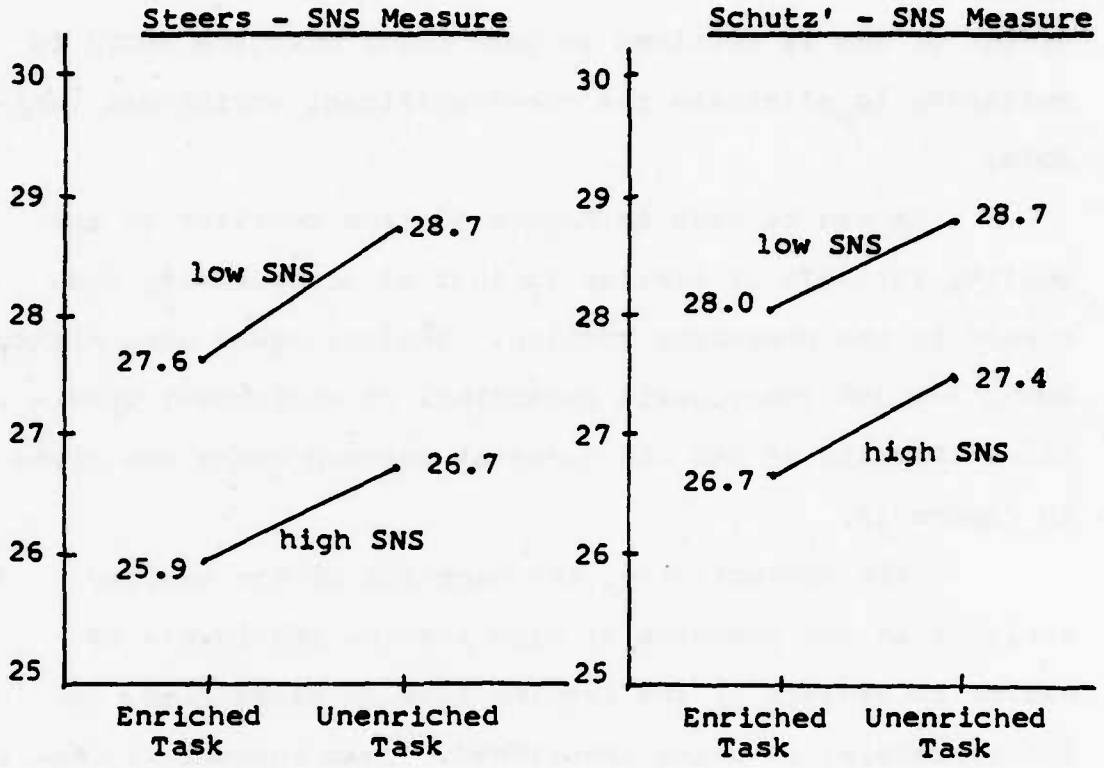
Like productivity, the behavior of the quality variable in the presence of high and low SNS levels is easier to explain if the Erector task is classified, in the aggregate, as being unenriched. Then support is generated for hypothesis 2.h. which addresses the unenriched work condition, but no evaluation can be made regarding hypothesis 2.g.

Overall Effects of Job Enrichment

Hypotheses 3.a. through 3.c. address the aggregate effects of job enrichment on work outcome without consideration of possible moderating roles played by GNS and SNS. They will be discussed according to the order in which they appear in Chapter 1.

Job enrichment and satisfaction.

Hypothesis 3.a. Individuals working in enriched jobs will be more satisfied than individuals working in unenriched jobs.



LSD Test Results

F Ratio: 1.732

Significance: n.s.(.181)

Significantly Different Means:*

28.7 > 27.6 > 26.7 > 25.9

LSD Test Results

F Ratio: 1.618

Significance: n.s.(.203)

Significantly Different Means:*

28.7 > 28.0 > 27.4 > 26.7

*Any means not underscored by the same line are significantly different. Those means underscored by the same line are not significantly different. Alpha = .05.

Figure 13. Impact of SNS and work quality in enriched and unenriched jobs.

Data generated by the Erector experiment strongly supports this hypothesis. Two-way analysis of variance with enrichment and task approach as independent variables, and satisfaction with the task (measured by JDI) as the dependent variable produced a significant main effect for the enrichment manipulation (alpha $< .001$), while the task approach manipulation was insignificant as a main effect. Collapse of the ANOVA to eliminate the insignificant factor yielded an F-ratio of 14.57, for the enrichment manipulation, also significant at alpha $< .001$. Table 22 enumerates ANOVA results.

A moderate interactive effect between level of enrichment and task approach was also apparent. This indicates that the impact of enrichment on satisfaction was affected by the social environment. A comparison of means in each of the four cells using the LSD technique indicates that the effects of enrichment levels on satisfaction were dampened when individuals worked together as a team. While the mean satisfaction score in enriched teams was slightly higher than that in unenriched teams (15.3 versus 13.1), the difference was not significant. Conversely, an individual approach to the Erector task seemed to intensify the effects of enrichment on satisfaction. Whereas individuals working alone in an unenriched task environment were less satisfied than their counterparts working as teams, individuals working alone in an enriched task were more

Table 22

Two-way Analysis of Variance Showing Effect of Enrichment and Task Approach on Satisfaction

	df	Mean Square	F	Significance
Main Effects:				
Enrichment	1	1333.8	15.22	.001
Approach	1	68.2	.78	n.s.(.999)
Two-way Interaction:				
Enr x App	1	468.6	5.346	.021
Residual	119	87.6		

Collapse of Two-way ANOVA to Eliminate Non-significant Main Effect

	df	Mean Square	F	Significance
Variable				
Enrichment	1	1320.3	14.57	.0001
Residual	121	90.6		

Multiple Classification Analysis

Satisfaction Grand Mean: 14.96

Effect of Independent Variables:

a. Enrichment
   present +3.30
   not present -3.25

b. Task Approach
   team - .74
   individual + .60

satisfied than their counterparts on teams. Results of the LSD test are provided in Table 23, with the interactive effect illustrated in Figure 14. A conclusion which might be drawn from this analysis is that enrichment procedures produce more favorable results (in terms of job satisfaction) when applied to individuals working alone. While a team approach dilutes enrichment impact, it also appears to ameliorate distasteful features of an unenriched task.

A correlation between MPS and satisfaction scores confirmed results of the two-way analysis of variance and provides additional support for hypothesis 3.a. Since data is at the interval level and is not categorized, for analysis purposes, according to experimental cell, it gives an independent measure of enrichment impact when correlated with satisfaction. The correlation coefficient of .484 was significant at the .001 level. Since MPS is a reliable indicator of enrichment present in a task, the significant correlation coefficient suggests a strong positive relationship between enrichment and satisfaction. This finding compares favorably with results of previous laboratory experiments (cf. Umstot, 1975; Hackman & Lawler, 1971; Hackman & Oldham, 1976; Sims & Szilagyi, 1976).

Job enrichment and productivity.

Hypothesis 3.b. Individuals working in enriched jobs will produce at higher levels than individuals working in unenriched jobs.

Data generated during the laboratory experiment is in

Table 23

Comparison of Satisfaction Means in Four Experimental Cells using the Least Significant Difference (LSD) Test

Cell	Satisfaction Mean	Overall F	Significance	Significantly Different Cells*
1) Enriched task performed in teams.	15.3	7.063	.001	3 > 1 > 2 > 4
2) Unenriched task performed in teams.	13.1			
3) Enriched task performed individually	20.8			
4) Unenriched task performed individually.	10.7			

*Any means not underscored by the same line are significantly different. Those means underscored by the same line are not significantly different. Alpha = .05.

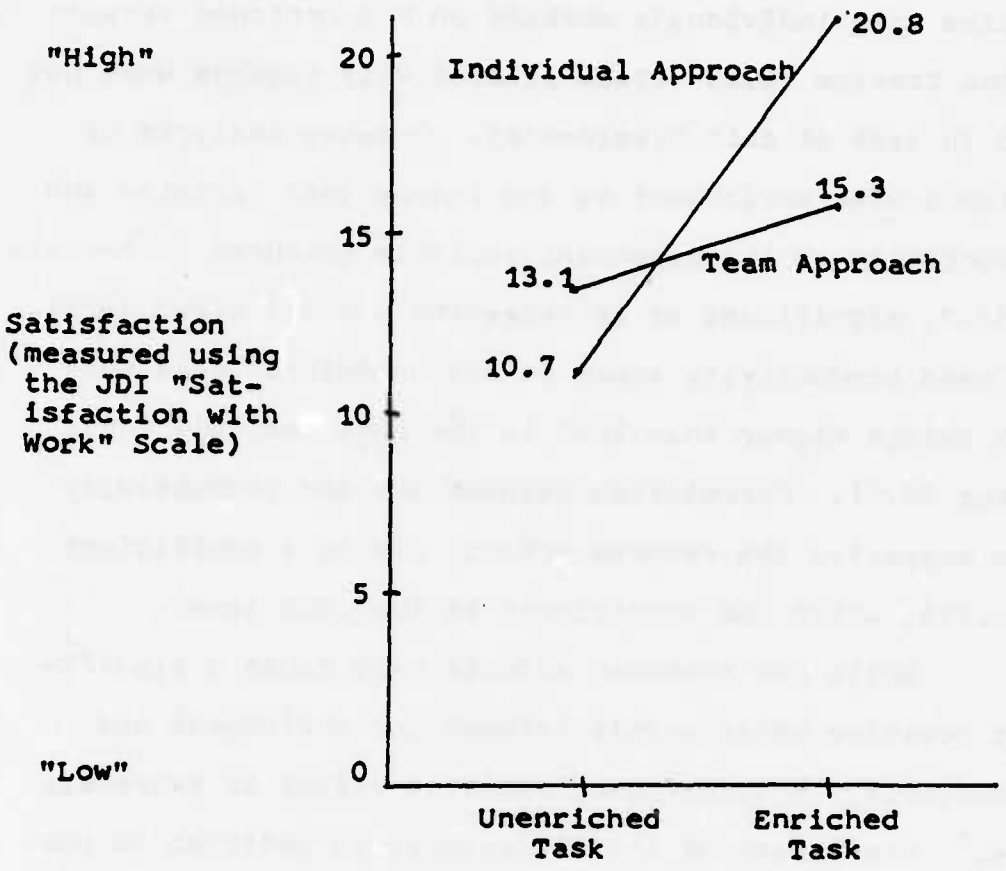


Figure 14. Three-factor diagram showing interactive effect of enrichment and task approach on job satisfaction.

direct conflict with the hypothesis. Individuals working under unenriched conditions were significantly more productive than individuals working on the enriched version of the Erector task. (Team productivity figures were not used in test of this hypothesis). One-way analysis of variance with enrichment as the independent variable and productivity as the dependent variable produced an F-ratio of 37.7, significant at an exceedingly small alpha level. The mean productivity score in the unenriched cell was 18.5 points higher than that in the enriched cell (48.5 versus 30.0). Correlation between MPS and productivity also supported the reverse effect, giving a coefficient of -.294, which was significant at the .008 level.

While few research efforts have found a significant positive relationship between job enrichment and productivity, a significant negative effect is extremely rare.* The thrust of the literature, in addition to possible design factors in the experiment, precludes the conclusion that job enrichment reduces productivity. The set-up in unenriched cells was especially conducive to higher productivity. The Erector component to be built was exceptionally simple (four nut-bolt connections per component); enough parts were positioned on work tables to

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*The one case uncovered by Umstot (1975, p. 60) involved a field experiment at a West coast pharmaceutical firm in 1955.

enable uninterrupted production for thirty minutes; and a physical sample of the component in addition to a drawing was provided. In the enriched version, the model to be constructed was more complex (eleven connections); parts had to be replenished from a central source; and only drawings of three different model choices were furnished. Observations showed that enriched individuals required about 5-7 minutes to understand construction requirements and complete their first model. Participants in the unenriched cell, on the other hand, completed their first component in under one minute. It is possible that the short duration of the experiment also contributed to the adverse productivity difference, although further analysis along these lines would be conjecture. Different research designs, discussed more fully in Chapter 5, would be more accurate in analyzing the effect of enrichment on productivity.

Job enrichment and work quality.

Hypothesis 3.c. Individuals working in enriched jobs will demonstrate a higher level of work quality than will individuals working in unenriched jobs.

No support was found for this hypothesis. Analysis of variance with quality as the dependent variable and enrichment as the independent variable produced an F-ratio of 2.6, which was significant only at alpha = .11. The trend, however, was in reverse direction from that predicted by the

hypothesis. The mean quality rating in the enriched-individual cell was 27.2 while that in the unenriched cell was 28.1. Correlation analysis between MPS and quality produced no additional support for this hypothesis. The coefficient of correlation, .0300, was not significant and bars any conclusions regarding the effect of task enrichment on work quality.

The nature of the Erector task may have precluded any significant findings concerning work quality. The overall simplicity of models allowed only a small range of differentiation between "good" and "bad" quality ratings. As discussed previously, quality scores could theoretically range from 0 to 30, however, actual data was heavily skewed with an overall mean of 27.6 and standard deviation of 2.3. The slight reverse trend could be tied to increased complexity of model construction and hence greater opportunity for error in the enriched cell. Again, a modified design may permit greater insight into the enrichment-quality relationship.

Summary of Results

Manipulations. Both analysis of MPS data and results of hypotheses tests confirmed the effectiveness of enrichment manipulations. Two versions of the Erector set task, while identical in overall work objective, produced the enrichment dichotomy needed to measure relationships

between variables under study. Except for task significance which exhibited a reverse reaction to manipulations, differences among core dimensions were distinct and in the desired direction. Their aggregate impact was sufficient to counteract the erratic behavior of task significance and produce significantly different MPS scores between enriched and unenriched experimental cells. A comparison of MPS scores generated in each replication concluded that no systematic bias existed in the sample which would prevent generalization of findings to the designated population.

Tests of overall hypotheses (3.a. through 3.c.) also indicated effectiveness of manipulations. In all three hypotheses tests, analysis of variance using enrichment on the nominal scale (present or not present) yielded results similar to those obtained through correlation, which evaluated enrichment on the interval scale across experimental conditions in the form of MPS data.

It should be noted that regardless of contrived enrichment condition, MPS scores in this experiment were low (enriched mean = 43.5; unenriched mean = 29.0) compared to the mean of 128.3 found by Hackman and Oldham (1975, p. 165) in a survey of 658 jobs covering a wide variety of career fields. The relatively low MPS means generated by the Erector task become important when interpreting results of GNS and SNS hypotheses tests.

The moderating effect of GNS. Hypotheses addressing

the impact of GNS on enrichment-work outcome relationships found support, although marginal, only in the case of work satisfaction. While GNS was significant as a main effect in influencing satisfaction levels, the predicted interaction between enrichment and GNS failed to materialize. The finding of significant main effect is congruent with prior research and hypotheses herein only if the Erector task is considered unenriched regardless of manipulations. Individuals with high GNS were invariably less satisfied with it than were low GNS individuals. GNS was found to have no significant impact on either the productivity-enrichment or quality-enrichment relationships, although a discernable GNS moderating influence emerged during analysis involving quality.

The moderating effect of SNS. Use of the Steers SNS measurement device, taken from the Need for Affiliation section of the MNQ, yielded the predicted interactive effect between SNS and task approach. Data analysis indicated that individuals with high SNS levels preferred working in teams, while those with low SNS preferred working alone. This phenomenon was more pronounced in enriched conditions where the differences were significant; differences under unenriched conditions were in the predicted direction although not significantly so.

While SNS had no significant impact on the enrichment-productivity relationship, it did show a strong main

effect on quality. Like GNS results discussed above, however, the main effect is explainable only if the Erector set is considered an unenriched task across experimental conditions. The predicted interactive effect between enrichment and SNS did not occur. Individuals with high SNS had lower work quality in both "enriched" and "unenriched" experimental cells.

Overall effectiveness of job enrichment. Strong support was found for the hypothesis that job enrichment caused increased satisfaction. Of the three dependent variables measured in this research, satisfaction with the task was the one most strongly influenced by manipulations.

Job enrichment was found to have a significant negative impact on productivity, but this result appears to be a function of variations in Erector assembly techniques rather than enrichment manipulations per se. Enrichment levels had no significant effect on work quality. Again, certain aspects of the experimental design may have led to this result.

Chapter 5

DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

Using the literature review and experimental findings presented earlier, this chapter views the research effort from a broad perspective. The discussion focuses on a comparison of the results with research objectives, validity and generalizability of findings, implications for DOD management, and recommendations for future research.

Research Objectives versus Research Results

The laboratory experiment was moderately successful in achieving objectives of the research as outlined at the onset. The methodology itself was followed as originally conceived with little deviation or compromise. Thus the Erector exercise can now be evaluated in terms of its capability to enhance the understanding of behavioral relationships operative during a job enrichment process.

Job enrichment and interpersonal differences. The literature review indicated that two personal characteristics, GNS and SNS, might account for the variance in individual reaction to a job enrichment effort. Based on past research (Hackman & Oldham, 1976; Umstot, 1975; Sims & Szilagyi, 1976; Alderfer, 1967), individuals with strong

needs for growth (GNS) and interpersonal relationships (SNS) were expected to react more positively, in terms of increased satisfaction and performance, to enriched jobs than were individuals with low need scores. The predicted interactive effect, however, failed to emerge at desired significance levels for either GNS or SNS. Rather, GNS was found to have a strong main effect on satisfaction, while SNS was found to have a significant main effect on performance.

One possible explanation for the GNS effect focuses on certain aspects of the research design. While the experimental task did achieve two distinct enrichment levels as measured by the JDS, the difference, in absolute terms, may not have been great enough to activate any underlying GNS-enrichment relationship. Specifically, it is possible that manipulations in enriched cells did not create a task high enough in MPS to appeal to high GNS individuals.

Research results, however, offer some support for the Hackman-Oldham (1976) job enrichment model if the Erector set task is considered an unenriched task regardless of manipulative condition -- a reasonable assumption given the relatively low MPS means.* Low GNS individuals were

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*Applicable statistics and comparison criteria are given in Chapter 4, under the heading "Summary of Results - Manipulations".

significantly more satisfied with the Erector task regardless of work situation to which exposed, while high GNS individuals were significantly less satisfied. This finding highlights the stronger negative reaction to a dull job exhibited by high GNS individuals, which constitutes one portion of the argument advanced by GNS research proponents. Another aspect of the argument -- that high GNS individuals react more positively to challenging work -- must be ignored if the Erector set task is viewed as unenriched overall.

The performance of low SNS individuals was superior to that of high SNS individuals under both enrichment conditions. Based on these results, it could be argued that high SNS employees are more concerned with other people in the work situation than with the work itself. Conversely, the low SNS individual is less interested in social intercourse and thus concentrates on achieving superior work performance. This conclusion is tentative and indicates the need for further research on the effect of SNS in an organization.

Job enrichment and work outcome. While this study was unable to detect any moderating impact of individual GNS or SNS, it was successful in isolating relationships attesting to the overall efficacy of job enrichment. "Satisfaction-with-the-task" was the dependent variable most strongly influenced by enrichment conditions. The

exceedingly high ANOVA F-ratio for enrichment as a main effect (F = 15.2, alpha < .001) and strong correlation between MPS and satisfaction (r = .48, alpha < .0001) demonstrated clearly the success of the research design in isolating an overall relationship, the viability of the Hackman-Oldham "Job Characteristics" model as a technique for enriching jobs, and the ability of job enrichment to increase worker satisfaction.

Other measures of work outcome (productivity and quality) were not enhanced by enrichment manipulations. Like other research endeavors (c.f. Umstot, 1975; Hackman &Lawler, 1971), this study failed to show a significant positive relationship between job enrichment and productivity. Rather, the mean productivity score in the unenriched cell was 61.6 percent higher than in the enriched cell (difference significant at alpha < .001). Perceived levels of job enrichment as measured by the *JDS* showed a strong negative correlation with productivity (r = -.29, alpha < .01). Thus, job enrichment appeared to have had a significant reverse effect on productivity.

The most plausible explanation for this unexpected deviation involves the short duration of the Erector task coupled with manipulations in unenriched cells which resulted in a productivity advantage there. As stated in Chapter 4, the layout of parts and simplicity of models to be built in unenriched cells was conducive to rapid model

construction. Future research efforts might attempt to correct the inequity by making an allowance for the lost productive time in enriched cells caused by task orientation and part replenishment requirements. For example, if 20 percent of the time in enriched cells is required to determine model construction method and replace parts, resultant productivity figures might be multiplied by a factor of 1.2 to enable realistic comparisons with unenriched cell productivity data. Such a technique or any variation thereof would require accurate measurement of lost productive time in each work situation to insure adjustment factors used are legitimate.

Quality of work was unaffected by degree of enrichment present. The quality level was slightly higher in unenriched cells, but the difference was not significant. This reverse trend may have been caused by the more complex design of the enriched task. Also, the nature of the Erector task may have precluded any findings concerning quality. Only deliberate attempts to produce an inferior product would have resulted in a low quality rating, since effort required to attain a perfect rating was minimal. Hence results of the experiment were unable to confirm a positive impact of job enrichment on work quality. Further research with a modified design is required to isolate a relationship if, in fact, one exists.

The team approach to work. A final objective of this experiment was to determine whether any difference exists in the fulfillment of social needs in a team versus individual approach to work. The specific hypotheses suggested that high SNS individuals would be more satisfied if allowed to work in teams, while low SNS individuals would prefer working alone. Strong support was obtained for this prediction. The proper combination of task approach (team or individual) and SNS (high or low) did exert a strong impact on satisfaction in both enriched and unenriched work situations. Individuals with high SNS working in a team had a higher level of satisfaction, while individuals with low SNS working in isolation had a higher level of satisfaction. These findings support predictions of the literature that interaction between SNS and social environment will influence worker satisfaction (Hackman & Lawler, 1971; Sims & Szilagyi, 1976), and indicate that when task approach used is congruent with individual SNS, the result will be a more satisfied worker.

One caveat, however, must be imposed on this conclusion. While measurement of SNS was accomplished using three distinct instruments, only one, the Steers Need for Affiliation questionnaire, was successful in isolating the predicted SNS-task approach interaction. The other two instruments apparently measured a variation of SNS which impacts on performance rather than satisfaction.

Specifically, the reformated Steers instrument disclosed a strong direct relationship between SNS and productivity, while the Schutz FIRO-B isolated a significant difference in work quality between high and low SNS individuals. While this research thus offers some support for both Steers and Schutz instruments, it clearly demonstrates the need for further development and validation of SNS measurement devices.

Internal Validity of the Experiment

Standardization of manipulations, random selection procedures, and short duration of the experiment minimized the threat to internal validity. Adverse effects due to history and maturation were virtually non-existant since the experiment involved just one treatment lasting only thirty minutes. Other concerns with internal validity remain, however, and are discussed below.

Contamination between sessions. Since each replication of the laboratory experiment was conducted at a different time during Spring, 1977, there is a possibility that students involved in an earlier experimental session could have contacted students in another class, hence contaminating the later replication. There is little evidence, however, to support the contention that this did, in fact, occur. While all classes were under AFIT sponsorship, each was administered by a different functional branch with little opportunity for inter-class communication.

Furthermore, class schedules were staggered, with each course lasting less than three weeks. Students were largely confined to one classroom during course duration, further reducing opportunities for contamination of other classes.

Selection. The 124 participants in this laboratory experiment cannot be considered a perfectly random sample of the DOD population because Continuing Education course enrollments are not determined by a random process. Rather, most personnel volunteer to attend AFIT-sponsored courses in an effort to improve job capabilities and, it might be assumed, have exhibited a level of performance in their current job which justifies the temporary duty expense involved. Hence, the possibility exists that expectations, attitudes and behavior of Continuing Education students are different from the DOD population as a whole. The research design attempted to counteract adverse effects due to selection by picking classes at random from the Spring 1977 schedule, making participation mandatory in classes used, and assigning individuals to different work situations on a random basis. It may thus be concluded that random procedures inherent in the methodology reduced the threat to internal validity caused by unique characteristics of Continuing Education enrollees if, in fact, any existed.

Summary of internal validity of the experiment. There appeared to be little serious threat to internal validity from history, maturation, or contamination between sessions. Since each questionnaire was administered just once to each participant, no adverse effects from repeated testing were anticipated. Any other possible distortions to experimental results (e.g., selection) were controlled by the random assignment procedures followed throughout.

External Validity of the Experiment

The basis for external validity. External validity is of vital concern if the extent to which research results are generalizable is to be determined. While problems of internal validity are amenable to solution through careful experimental design, problems associated with external validity are not. Rather, the degree of external validity can only be established by inductive reasoning; e.g., what factors enable or prevent extrapolating beyond the immediate environment from which data was collected? According to Emory (1976, p. 306), the experimenter must "guess which factors can be ignored and which will interact". The key to external validity involves finding areas of common ground between the sample used and the population to which results are inferred.

Population validity. The population to which these research findings will be inferred is the DOD work force.

While the issue of sample-to-population comparability is never completely resolved, there are several factors that give the sample in this experiment more generalizability than might be possible in other cases.

The sample was comprised of females and males from various specialty career fields within DOD. Most participants could be categorized as middle level managers, career oriented, and typical of the white-collar segment in the DOD workforce. The different career fields and grade levels gave the sample a measure of diversity and made it highly representative of the typical middle manager as well as the employee who aspires to a management position.

Furthermore, GNS scores for the sample followed a distribution quite similar to that found in the general population. The GNS mean in the Continuing Education sample was 5.76 with a standard deviation of .90 which compares favorably to GNS statistics generated in the Hackman-Oldham (1975) survey of 658 employees ($\bar{x}$ = 5.62, σ = 1.28). It would therefore seem reasonable to draw the conclusion that the results of this experiment could be applied to a larger target population.

In summary, it appears that the sample was not significantly different from the DOD population it represents. The authors thus consider external validity of the research sufficient to permit generalization beyond

the immediate confines of the experiment.

Conclusions regarding validity and generalizability. The characteristics of the sample provide adequate support for external validity. The experimental design and methodology incorporated strict controls necessary for internal validity. Maximization of both external and internal validity insures maximum generalizability of results.

Implications for DOD Management

As indicated in the first chapter, actions taken within DOD indicate a general acceptance of job enrichment as a sound motivational tool. This study serves to reinforce that position, but makes an additional contribution. While the most notable military job enrichment efforts have utilized the "orthodox" techniques espoused by Fredrick Herzberg (cf. Herzberg & Rafalko, 1975), alternate strategies should be investigated. Specifically, the Hackman-Oldham model has been shown by this research to hold considerable potential for guiding future job enrichment programs.

Top management concern. The finding of a strong relationship between enrichment and satisfaction becomes especially important in view of recent emphasis placed on self-fulfillment by top military leaders. In a March, 1977 address to the Women's Forum on National Security, General George Brown, Chairman of the Joint Chiefs of Staff,

identified certain forms of "intangible compensation" as critical performance motivators. One such motivator -- "a personal sense of fulfillment from the service" was stressed before all others:

> ...this intangible compensation comes from military leaders. It comes from insuring that the soldier's time is spent on worthwhile, significant activities, so that he or she can enjoy a measure of job satisfaction (Brown, 1977).

By placing the responsibility for job satisfaction on the military manager, General Brown highlights the need for techniques which can be used at all levels to achieve increased job satisfaction.

Improving satisfaction through job enrichment. This study and other research projects provide strong support for the contention that job enrichment improves satisfaction. Clearly, many jobs exist throughout the military which are sources of employee alienation and which might therefore benefit from the job enrichment process. In the long run, the impact of job enrichment could reduce satisfaction-related costs such as personnel turnover, training costs for new personnel, absenteeism, work-related grievances, and low re-enlistment rates.

A viable technique. This study confirms the validity of the Hackman-Oldham (1976) Job Characteristics Model and its applicability to the job enrichment process. By manipulating any or all of the five core dimensions present in a task, a job can be made more enriched.

Conversely, reducing any or all of the core dimensions will produce dull or routine jobs. Therefore, by properly analyzing a specific task and by manipulating its core dimensions, a routine military task may be made more appealing, resulting in a more satisfied person.

Erector set task manipulation versus real tasks. Although the Erector set task used in this experiment does not have any "real military" significance by itself, the results of manipulations are important. They indicate that an exceedingly simple task can be broken down into core dimensions and manipulated to achieve a higher MPS. The implication is that the Hackman-Oldham approach utilized in the Erector task is highly suitable for use throughout the DOD. Routine tasks with enough flexibility to permit manipulation of core dimensions can be enriched successfully.

Team approach for dull tasks. Not all tasks in the military are "enrichable". There will continue to exist dull, routine, everyday tasks that are inflexible and may not lend themselves to the job enrichment process--or, at best, to only limited application of theory. Results of this research indicate that the military should use a team approach whenever possible in the performance of such tasks. As indicated by the significant interactive effect between enrichment and task approach, individuals will be more satisfied working within a team framework rather than working alone whenever the job is unenriched. Conversely,

a team approach seemed to reduce the satisfying aspects of an enriched job--individuals find challenging work more satisfying if they are performing alone.

Enrichment and performance. The fact that this research found no positive relationship between enrichment and performance is no cause for management concern. The short time span of this experiment coupled with design limitations makes generalization of performance findings inappropriate. The inability of field research to confirm this relationship, however, may stem from other difficulties, principally the inability to develop concrete, comprehensive measures of productivity. Research on this topic will invariably continue until the issue is resolved. In the interim, management interests are best served by approaching the performance question on an intuitive basis. The rationalization implicit in the Hackman-Oldham model offers such an approach. Enrichment, it is suggested, provides psychological rewards which, in turn, generate improved performance.

Consideration for Growth Need Strength (GNS). The findings of this research suggest that the level of an individual's desire for growth satisfaction does indeed affect his attitude toward work. While hypotheses tests involving GNS were inconclusive, the data did indicate a lower degree of tolerance for dull jobs among high GNS individuals. Based on this finding, the military manager

interested in reducing overall worker dissatisfaction might concentrate his enrichment efforts on high GNS subordinates. The JDS has been shown to be a valid indicator of GNS and could be administered to identify potential enrichment candidates.

Implication for Future Research

Benefits of the laboratory. Most job enrichment research has been conducted in the field with attendant problems of cost and research design compromise. Furthermore, environmental factors, work disruptions, and personnel cannot be controlled as well in the field as in a laboratory setting. These advantages, all visible in this study, make continued use of the laboratory a viable option for the DOD researcher. Relationships operative in a job enrichment endeavor are particularly well suited to examination in the laboratory. Concluding remarks will therefore focus on possible modifications or extensions to the laboratory experiment performed as part of this study.

The task -- most critical element. The success of an experiment in job enrichment depends on designing a laboratory task flexible enough to enable identification and manipulation of core dimensions in order to produce desired enrichment variations. Obviously, the number of task possibilities is limited only by the researcher's resourcefulness and imagination. Variations of the Erector

task are numerous. Results of experience with it, however, present two areas for future improvement.

First, the task must be sufficiently complex in an enriched situation to allow the MPS mean to approximate or exceed that found in the Hackman-Oldham survey ($\bar{x}$ = 128.3; 1975). Second, the resultant design should achieve a higher degree of task significance in the enriched condition, correcting the reverse phenomenon exhibited in this study.

Making the Erector task more complex poses no substantial problem. Models replicating aircraft or other military weaponry could be built from sophisticated drawings--resulting in a task which might be high in significance as well as skill variety. Another variation might involve delineation of a specific problem, with subjects asked to design and build a model which would solve the problem. For example, participants might be told that a bridge is needed to cover 100 feet of water and then directed to design and build one (to scale) using a wide variety of Erector parts. Increasing complexity of the task would necessarily involve a longer run time which could generate other advantages. Specifically, quality and productivity findings might have been more favorable if the run time had been longer. Thirty minutes did not appear to provide sufficient time for boredom and disinterest to significantly slow production in the unenriched groups. While comments

of participants during the sessions clearly indicated dissatisfaction, a high level of performance was maintained. The most plausible explanation for this reaction is that participants were aware of the short duration of the experiment and decided to carry out the instruction to "make as many components as you can" without hesitation. It is reasonable to suggest, however, that motivation to perform would, after a longer period, decrease with an attendant drop in productivity and quality. Thus the longer run time might precipitate the predicted enrichment-performance relationships.

Same task -- different sample. An experiment similar to that used in the present study should be conducted utilizing a sample comprised of lower ranking enlisted personnel (grades of E-5 or below) and civilian equivalents. This sample is probably more representative of the population to which enrichment efforts might be more frequently applied. The obvious concerns shown by military leaders for motivation, affiliation, a sense of fulfillment, and job satisfaction should promote a replication utilizing another sample to see whether results could be duplicated. By so doing, the conclusions of both this effort and its follow-on would benefit from maximum generalizability to the DOD population.

APPENDIX A

SCRIPT 1: ENRICHED TASK -- TEAM AND INDIVIDUAL APPROACH

Script 1: Enriched Task -- Team & Individual Approach

Note: Each experimenter handled two cells: a) one experimenter served as "leader" for the enriched cells (both team and individual task approaches), while b) the second experimenter served as "leader" for the unenriched cells.

I. INTRODUCTION TO PARTICIPANTS

A. Setting: All participants assembled in regular classroom.

B. Thesis advisor introduces experimenters as follows:

"Good morning (afternoon). I'm Lieutenant Colonel Umstot from the faculty of the AFIT Graduate School of Logistics and we are here to conduct a short experiential learning exercise. This exercise will also augment a research project, so, it has several purposes.

"To conduct this exercise, we will be breaking up into smaller groups and moving to separate classrooms. To make this easier, we will now assign everyone a number. Please remember this number until you get to the next classroom."

"The following people are assigned number 1." (Advisor reads names, which constitute unenriched-individual cell participants).

"The following people are assigned number 2." (Advisor reads names, which constitute the first team of the unenriched-team cell.)

"The following people are assigned number 3." (Advisor reads names, which constitute the second team--if applicable--of the unenriched-team cell.)

"Will these individuals, with numbers one through three, please follow (name of experimenter) to another room."

C. At this point, approximately one-half of class leaves with the experimenter for the unenriched cells. Script 2 for this segment is found as Appendix B. The advisor continues:

"The following people are assigned number 4." (Advisor reads names, which constitute enriched-individual cell participants.)

"The following people are assigned number 5." (Advisor reads names, which constitute the first team of the enriched-team cell.)

"The following people are assigned number 6." (Advisor reads names, which constitute the second team--if applicable--of the enriched-team cell.)

"Will these individuals please follow (name of experimenter) to another room."

II. SUBSEQUENT CONDUCT OF THE LABORATORY EXPERIMENT

A. Setting: All participants in the enriched cells (whether team or individual approach) will be led to the classroom where enriched-individual cell participants will work. Initially all participants will be briefed jointly.

B. Set-up of "Enriched-Individual" Room:

1. Each participant will have a chair and work table. Extra chairs will be positioned along the perimeters of the room to permit enriched-team participants to sit during the joint briefing.

2. The following items will have been prepositioned on each work table:

a) Drawings of three different Erector models: (1) a tea-cart, (2) a tea-wagon, and (3) a stock cart.

b) Enough parts in a pie-tin in the middle of the work table to build one of any model.

c) One screwdriver and one wrench.

3. Completed examples of the three Erector models will be displayed on a table in the middle of the room. Also, extra parts will be available on this table in sufficient quantities to enable uninterrupted work until time is called.

C. Initial Instructions: Upon entering room with participants, experimenter gives following directions:

"Will all individuals assigned number "4" please take a seat at one of the work tables. Other individuals will be

leaving this room shortly. Please be seated in the chairs remaining, or continue standing."

(after places are found) "In this exercise, we will be studying how well people perform on various types of tasks. Please observe the work tables. On those tables you will see an assortment of Erector set parts, drawings of three different models which can be constructed with those parts, a screwdriver, and a small wrench."

"We would like you to construct as many copies of these Erector models as you can until we tell you to stop. You will be given about 30 minutes."

"You are not required to work on any one of the three models. Rather, feel free to work on whichever one you prefer, or switch back and forth between models if you so desire. Please complete one model before starting another."

"There are enough parts in the pie-tin in front of you to build any one of the three different models. Although there are some variations, each model is equal to the others in difficulty of construction."

"Already assembled models have been positioned on the table in the center of the room. If you have difficulty with the drawings, please feel free to inspect these models. Please note that wheels do not turn freely on completed models."

"This task will enable you, as managers, to learn more about designing jobs for the people that work for you. Even though the task may seem trivial, it has important real world implications."

"In addition, we hope your participation here will further our understanding of DOD motivational problems."

"What you are building here is a number of complete models. Since you are producing each model from start to finish, only you are responsible for the quality and quantity of work."

"More parts are available on the table in the center of the room. As you need more parts, feel free to get them from this table. Parts supplies are limited, however. Take only what you need to make one or two models."

"Feel free to move around the classroom or take a break if you desire. I will be happy to answer questions, but please do not talk to your classmates during this exercise."

"As you complete models, leave them on the table in front of you. Do not dissassemble any models--you will not be asked to dissassemble them after the exercise."

"If there are no questions, will number 4's please begin work. Will numbers 5 and 6 please follow me to another room."

D. Set-up of "Enriched-Team" Room;

1. Each team will have one work table and four chairs. The table will be labeled with team number (e.g. "5" or "6") to facilitate seating. A smaller table will have been placed along side to hold models constructed by the team.

2. Completed examples of the three different Erector models will be positioned on each work table. In addition, one set of drawings will be positioned on each side of the work table.

3. Enough parts will be placed in a pie-tin on each of the team work tables to permit construction of one of any model.

4. A screwdriver and wrench will be placed at each work position.

5. A table in the center of the room will serve as the part replenishment point. Enough Erector parts will be available in containers on this table to insure uninterrupted work for thirty minutes.

E. Instructions to Enriched Teams: Experimenter continues instructions as enriched-team cell participants enter room:

"Please be seated at the table which bears your team number."

(After participants are seated) "You will also be building complete Erector set models, identical to those being built in the other room. Each team will be responsible for putting models together from start to finish. Please build as many as you can until we tell you to stop. Place models you finish on the adjoining table."

"There are drawings of the three different models at each table. Your team may select any one of the models to build or may switch back and forth between models. Samples of

these models are in the center of your work table."

"Your team is free to devise its own work strategy and assembly process. You are free to move about as needed and talk to other team members."

"Please do not talk to members of the other team."

"There are enough parts in the pie-tin on your table to build any one of the three models. You may replenish your part supplies from the central table. Parts supplies, however, are limited. Please do not take more than your team needs for two or three models."

"If there are no questions, please begin work."

III. ADMINISTRATION OF POST-EXERCISE QUESTIONNAIRE (JDS-JDI).

A. After 30 minutes of work, the experimenter will call time and administer the JDS-JDI. Approximately three minutes will separate start times of the two groups (individual, team). Thus, time will be stopped first in the individual group and the questionnaire administered, then in the team group and the questionnaire administered. Directions provided will be identical in both groups and are as follows:

"Please stop work. Leave all parts and tools in front of you."

"At this time we would like you to complete a short questionnaire on the Erector task you have just completed. Please be as honest and accurate as you can in answering this questionnaire."

"Please do not talk to anyone else while filling it out. After you have completed the questionnaire, please leave it at your work position. You may then take a short break and return to your regular classroom by (time)."

B. Experimenter then passes out questionnaire and insures participants leave it at their respective work positions to enable match of work accomplished to appropriate questionnaire respondent.

APPENDIX B

SCRIPT 2: UNENRICHED TASK -- TEAM AND INDIVIDUAL APPROACH

Script 2: Unenriched Task -- Team & Individual Approach

Note: This script outlines conduct of the experiment for the unenriched cells after the introduction by the advisor has been made, participants have been assigned numbers, and the leader guides participants to the appropriate classroom. This introductory sequence may be found in Appendix A (Script 1).

I. CONDUCT OF THE LABORATORY EXPERIMENT AFTER INTRODUCTION

A. Setting. Participants in the unenriched cells will be immediately divided into two rooms--one for individual performance, one for team performance. The following directions will be given as all participants enter the room designated for individual performance:

"Will all individuals with number "1" please take a seat at one of the work tables."

"Will individuals with numbers "2" and "3" please step into the next room (points if necessary) and take a seat at the table with your number on it. (To teams) Please stand-by for a few minutes. I'll be right back."

B. Set-Up of "Unenriched-Individual" Room: Experimenter returns to individual room where materials, tables have been prepositioned as follows:

1. Each participant will have a chair and work table.

2. The following items will have been prepositioned on each work table:

a) Already constructed sample Erector component to be built.

b) Drawing of component to be built.

c) Erector parts in containers (nuts, bolts, wheels, etc.) and loose (flat plates, long braces) in quantities sufficient to make 30 components.

d) One screwdriver and one wrench.

3. The participant will build one of the four following components:

   a) Tea-cart handle assembly without wheels.

   b) Tea-cart body with wheels on small strips.

   c) Stock cart handle assembly with double wheels.

   d) Tea-wagon body with four small strips, no wheels.

4. Work tables will be arranged so as to prevent participants from observing classmates.

C. Instructions to "Unenriched-Individual" cell Participants: After directing the team participants to be seated in a separate room, the experimenter returns to the first classroom where participants working alone are seated at work tables. The following instructions are given:

"Please observe the work tables in front of you. On those tables you will see a variety of Erector set parts, an Erector component made from those parts, a drawing of that component and some tools."

"We would like you to use these parts to put together copies of the assembled unit you see on the table. We would like you to build as many of these units as you can until we tell you to stop. You will be given about 30 minutes."

"The task before you is not an especially difficult one. In fact, we expect that individuals of your grade-level will find it very easy. Even so we are interested in finding out how many of the units you can produce."

"What you are building here are actually only components of larger Erector models. We plan to have someone else finish the model at another time. Hence, you are not going to be held responsible for the larger model when it is finished, but only for the work you do now. Someone else will later check the quality of the whole model."

"You should have enough parts in front of you to continue working until time is called. If you run out of parts, please raise your hand. Please do not leave your seat at any time and please do not talk to your classmates during this exercise."

"If there are no questions, please begin work."

D. Set-Up of "Unenriched-Team" Room. After reciting the foregoing instructions, the experimenter returns to the room where unenriched teams are waiting. The rooms will have been set-up as follows:

1. Each team will have one work table and four chairs. The table will have been labeled with a team number (e.g. "2" or "3") to facilitate seating. A smaller table will have been placed alongside to hold components constructed by the team.

2. Each position at the work table will be labeled with a number from one to four. This will be done to identify the assembly line process used to construct a component.

3. A single component will be built in assembly line fashion, with each team member fastening two of the eight bolts on the component. A sample of how the component should appear at each step in the process will be placed at the appropriate work position (e.g. the component as it appears when 25% complete at position 1; the component as it appears when 50% complete at position 2; etc.)

4. Each team will be assigned to build either of the following components:

   a) Tea-wagon without wheels.

   b) Tea-cart without wheels.

5. Parts sufficient to build 80 components will be separately placed at each work position according to the task performed by that position.

6. A drawing of how the component should look at each step in the process will be placed at the appropriate work position, along with a wrench and screwdriver.

E. Instructions to "Unenriched-Team" cell Participants: After entering the room, the experimenter will give the following directions:

"Please observe the materials on your team work tables. You should see a variety of Erector set parts, samples of components which can be made with these parts, drawings, and some tools."

"We would like you to work as teams to put together as many of the Erector components as you can, until time is called. You will be given about 30 minutes."

"As you can notice, we would like you to operate in assembly line fashion. Each team member will fasten two of the eight bolts in this component."

"The process starts with the team member sitting in position labeled "1". He will attach parts as shown on the drawing and example in front of him. He will then pass the partially complete item to team member "2" who will perform the next operation as indicated by the drawing and example in front of him, and so on."

"Continue passing the item to the next person until it is finished. Build as many components as you can until time is called."

"The task before you is not an especially difficult one. In fact, we expect that individuals of your grade-level will find it very easy. Even so, we are interested in finding out how many of the units you can produce."

"I want to emphasize that what you are building here are actually only components of larger Erector models. We plan to have someone else finish the model at another time. Hence, you are not going to be held responsible for the large model when it is finished, but only for the work you do now. Someone else will later check the quality of the whole model."

"Leave completed units on the table as indicated. There should be enough parts in front of you to continue working until time is called. Please raise your hand if you run out."

"Please do not get up from the tables during this exercise, or talk to any member of the other team."

"If there are no questions, please begin work."

II. ADMINISTRATION OF POST-EXERCISE QUESTIONNAIRE (JDS-JDI)

A. After 30 minutes of work, the experimenter will call time and administer the JDS-JDI. Approximately 3 minutes will separate start times of the two groups (individual, team). Thus, time will be stopped first in the individual group and the questionnaire administered, then in the team group and

the questionnaire administered. Directions provided will be identical in both groups and are as follows:

"Please stop work. Leave all parts and tools in front of you."

"At this time we would like you to complete a short questionnaire on the Erector task you have just completed. Please be as honest and accurate as you can in answering this questionnaire."

"Please do not talk to anyone else while filling it out. After you have completed the questionnaire, please leave it at your work position. You may then take a short break and return to your regular classroom by (time)."

B. Experimenter then passes out questionnaire and insures participants leave it at their work positions to enable match of work accomplished to appropriate questionnaire respondent.

APPENDIX C

MODIFIED VERSION OF THE JOB DIAGNOSTIC SURVEY

PRIVACY STATEMENT

In accordance with paragraph 30, AFR 12-35, the following information is provided as required by the Privacy Act of 1974:

a. Authority:

(1) 5. U.S.C. 301, Departmental Regulations, and/or

(2) 10 U.S.C. 8012, Secretary of the Air Force, Powers, Duties, Delegation by Compensation; and/or

(3) EO 9397, 22 Nov 43, Numbering System for Federal Accounts Relating to Individual Persons; and/or

(4) DOD Instruction 1100.13, 17 Apr 68, Surveys of Department of Defense Personnel; and/or

(5) AFR 30-23, 22 Sep 76, Air Force Personnel Survey Program.

b. Principal purposes. The survey is being conducted to collect information to be used in research aimed at illuminating and providing inputs to the solution of problems of interest to the Air Force and/or DOD.

c. Routine Uses. The survey data will be converted to information for use in research of management related problems. Results of the research, based on the data provided, will be included in written master's theses and may also be included in published articles, reports, or texts. Distribution of the results of the research, based on the survey data, whether in written form or presented orally, will be unlimited.

d. Participation in this survey is entirely voluntary.

e. No adverse action of any kind may be taken against any individual who elects not to participate in any or all of this survey.

USAF Survey Control Number 77-99
(Expires 30 September 1977)

WORK ATTITUDES QUESTIONNAIRE -- Phase II

Student Identification: (last 4 digits SSN) | | | | |

Part One

We would like your opinion of the task you just worked on. Please try to think only about the task of assembling the Erector set parts, other people in the room with you, and the leader (AFIT grad student).

Insert the number which best represents how you feel about that item with regard to the Erector set exercise.

How accurate is the statement in describing the Erector set task?

1	2	3	4	5	6	7
Very Inaccurate	Mostly Inaccurate	Slightly Inaccurate	Uncertain	Slightly Accurate	Mostly Accurate	Very Accurate

____ 1. The task required me to use a number of complex or high-level skills.

____ 2. The task was arranged so that I did NOT have a chance to do an entire piece of work from beginning to end.

____ 3. Just doing the work required by the task provided many chances for me to figure out how well I was doing.

____ 4. The job was quite simple and repetitive.

____ 5. The leader and co-workers on this task almost never gave me any "feedback" about how well I was doing on my Erector models.

____ 6. This task is one where a lot of other people could be affected by how well I performed.

____ 7. This task denied me any chance to use my personal initiative or judgment in carrying out the work.

____ 8. The leader often let me know how well I was performing.

____ 9. The task provided me the chance to completely finish the pieces of work I had begun.

____10. The task itself provided very few clues about whether or not I was performing well.

____11. The task gave me considerable opportunity for independence and freedom in how I did the work.

____12. The task itself was NOT very significant or important in the broader scheme of things.

APPENDIX D

KEY TO INTERPRETATION OF THE MODIFIED JOB DIAGNOSTIC SURVEY

Core Dimension	Question Number (Appendix C) (R = reverse scoring)
Skill Variety	1, 4R
Task Identity	2R, 9
Task Significance	6, 12R
Autonomy	7R, 11
Feedback/Job	3, 10R
Feedback/Others	5R, 8

APPENDIX E

MODIFIED VERSION OF THE JOB DESCRIPTIVE INDEX

Part Two

In this section we want you to describe your reactions to the Erector set task you have just worked on.

Below are listed a number of words which can be used to describe work in general. In the blank beside each word write:

__Y__ for "Yes" if it describes the Erector set task

__N__ for "No" if it does NOT describe it

__?__ if you cannot decide

Words to Describe the Task

_____ Fascinating

_____ Routine

_____ Satisfying

_____ Boring

_____ Good

_____ Creative

_____ Respected

_____ Hot

_____ Pleasant

_____ Useful

_____ Tiresome

_____ Healthful

_____ Challenging

_____ On your feet

_____ Frustrating

_____ Simple

_____ Endless

_____ Gives sense of accomplishment

Part Three

In this section we want you to describe your reactions to the way in which the AFIT grad student (leader) conducted the Erector set task.

Below are listed a number of words which can be used to describe supervisors in general. In the blank beside each word write:

__Y__ for "Yes" if it describes the leader

__N__ for "No" if it does NOT describe him.

__?__ if you cannot decide

Words to Describe the Leader

_____ Asks my advice

_____ Hard to please

_____ Impolite

_____ Praises good work

_____ Tactful

_____ Influential

_____ Up-to-date

_____ Doesn't supervise enough

_____ Quick tempered

_____ Tells me where I stand

_____ Annoying

_____ Stubborn

_____ Knows job well

_____ Bad

_____ Intelligent

_____ Leaves me on my own

_____ Around when needed

_____ Lazy

APPENDIX F

PERFORMANCE SCORE SHEET

PERFORMANCE SCORE SHEET

Student I.D._____

(Enriched -- last 4 digits, SSN)
(Unenriched -- team or position no.)

PRODUCTIVITY COUNT: _____

QUALITY SCORE:

Criteria	Score
1. Tightness of nut/bolt connections?	_____
2. Correctness of model-- bolts in correct holes?	_____
3. Wheels facing properly?	_____
4. Bolts facing properly?	_____
5. Supports, handles perpendicular?	_____
6. Platforms, angle-irons facing properly?	_____
TOTAL	_____

APPENDIX G

GNS-SNS QUESTIONNAIRE

DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY (AU)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

REPLY TO ATTN OF: LSGR (LSSR 9-77B/Maj Kotzun/Lt Horstman/AUTOVON 787-4240)

SUBJECT: Work Attitudes Questionnaire

TO:

1. The attached questionnaire was prepared by a research team at the Air Force Institute of Technology, Wright-Patterson AFB, Ohio. The purpose of the questionnaire is to measure the strength of certain attitudes held by the Department of Defense (DOD) work force.

2. You are requested to respond to statements as indicated in the instructional paragraph preceding each section of the questionnaire. Headquarters USAF Survey Control Number 77-99 has been assigned to this research. Your participation is voluntary.

3. Your responses to the questions will be held confidential. Please remove this cover sheet before returning the completed questionnaire. Your cooperation in providing this data will be appreciated and will be very beneficial in analyzing work attitudes prevalent in the DOD work force.

4. Please answer each question in a way which best represents your feelings and attitudes about your work. There are no "right" or "wrong" answers. Your completed questionnaire will be collected at the beginning of class tomorrow. Please bring it with you then.

Henry W. Parlett

HENRY W. PARLETT, Colonel, USAF
Associate Dean for Graduate Education
School of Systems and Logistics

2 Atch
1. Questionnaire
2. Return Envelope

WORK ATTITUDES QUESTIONNAIRE

USAF SCN 77-99 (Expires 30 September 1977)

PRIVACY STATEMENT

In accordance with paragraph 30, AFR 12-35, the following information is provided as required by the Privacy Act of 1974:

a. Authority:

(1) 5. U.S.C. 301, Departmental Regulations, and/or

(2) 10 U.S.C. 8012, Secretary of the Air Force, Powers, Duties, Delegation by Compensation; and/or

(3) EO 9397, 22 Nov 43, Numbering System for Federal Accounts Relating to Individual Persons; and/or

(4) DOD Instruction 1100.13, 17 Apr 68, Surveys of Department of Defense Personnel; and/or

(5) AFR 30-23, 22 Sep 76, Air Force Personnel Survey Program.

b. Principal purposes. The survey is being conducted to collect information to be used in research aimed at illuminating and providing inputs to the solution of problems of interest to the Air Force and/or DOD.

c. Routine Uses. The survey data will be converted to information for use in research of management related problems. Results of the research, based on the data provided, will be included in written master's theses and may also be included in published articles, reports, or texts. Distribution of the results of the research, based on the survey data, whether in written form or presented orally, will be unlimited.

d. Participation in this survey is entirely voluntary.

e. No adverse action of any kind may be taken against any individual who elects not to participate in any or all of this survey.

WORK ATTITUDES QUESTIONNAIRE -- Phase I

Student Identification: (Last 4 digits of SSN) | | | | |

Rank or Grade (circle one):

O-1	E-1	GS-3	WG-3
O-2	E-2	GS-4	WG-4
O-3	E-3	GS-5	WG-5
O-4	E-4	GS-6	WG-6
O-5	E-5	GS-7	WG-7
O-6	E-6	GS-9	WG-8
	E-7	GS-11	WG-9
	E-8	GS-12	WG-10
	E-9	GS-13	WG-11

Career Field (check one):

Procurement ____ Maintenance ____

Inventory Mgmt ____ Transportation ____

Other _____ (specify)

Part One

Listed below are a number of characteristics which could be present on any job. People differ about how much they would like to have each one present in their own jobs. We are interested in learning how much you personally would like to have each one present in your job.

Using the scale below, please indicate the degree to which you would like to have each characteristic present in your job.

4 ------- 5 ------- 6 ------- 7 ------- 8 ------- 9 ------- 10

Would like having this only a moderate amount (or less) — Would like having this very much — Would like having this extremely much

____ 1. A high degree of job security.
____ 2. Opportunities for personal growth and development on the job.
____ 3. Very high pay.
____ 4. Working as a member of a group rather than by myself.
____ 5. Chances to exercise independent thought and action in my job.
____ 6. Opportunities to socialize with my co-workers.
____ 7. Stimulating and challenging work.
____ 8. Working alone on the job instead of with a group of people.
____ 9. Generous retirement benefits.
____10. Opportunities to be creative and imaginative in my work.
____11. Working in an open area where I can see and talk to my associates or co-workers.
____12. A sense of worthwhile accomplishment in my work.
____13. A dangerous job.
____14. Opportunities to learn new things from my work.
____15. Chances to work together with others in carrying out my job.

Part Two

The following statements describe various things people do on their jobs or the way they view their relationships with co-workers. We would like to know which of these statements you feel most accurately describes your own behavior at work.

Please indicate your feelings by inserting the appropriate number from the scale below:

1	2	3	4	5	6	7
Never	Almost Never	Seldom	Sometimes	Usually	Almost Always	Always

____ 1. I try to be friendly to people.

____ 2. When I have a choice, I try to work in a group instead of by myself.

____ 3. I do my best work when my job assignments are fairly difficult.

____ 4. I tend to join social organizations when I have an opportunity.

____ 5. I pay a good deal of attention to the feelings of others at work.

____ 6. I try very hard to improve on my past performance at work.

____ 7. My personal relations with people are cool and distant.

____ 8. I prefer to do my own work and let others do theirs.

____ 9. I take moderate risks and stick my neck out to get ahead at work.

____10. I try to be included in informal social activities.

____11. I express my disagreements with others openly.

____12. I try to avoid any added responsibilities on my job.

____13. I try to have close, personal relationships on my job.

____14. I find myself talking to those around me about non-business related matters.

____15. I try to perform better than my co-workers.

____16. When people are doing things together, I tend to join them.

APPENDIX H

KEY TO INTERPRETATION OF GNS-SNS QUESTIONNAIRE

Questionnaire Part Number	Question Numbers*	Characteristic Measured	Source from which Obtained
One	1,3,9, 13R	"Dummy" questions	Hackman & Oldham (1975)
One	2,5,7,10 12,14	GNS	Hackman & Oldham (1975)
One	4,6+,8R+, 11,15	SNS ("reformated Steers")	No. 4--Steers & Braunstein (1976) but modified to comply with format Nos. 6,8,11--Devised by Umstot and Rosenbach No. 15--Suggested by Hackman
Two	1+,4,7R+, 10,13+,16	SNS ("Schutz")	Schutz (1958)
Two	2,5,8R, 11R,14	SNS ("Steers")	Steers & Braunstein (1976)
Two	3,6,9, 12R,15	Need for Achievement	Steers & Braunstein (1976)

* "R" indicates reverse scoring

+ These five questions were eliminated from calculation of composite SNS scores as a result of factor analysis. Factor loadings on these questions were all under .3.

APPENDIX I

EFFECTIVENESS OF ENRICHMENT MANIPULATIONS BY CORE DIMENSION -- PILOT TEST

AD-A047 137 AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHO--ETC F/G 5/9
THE IMPACT OF GROWTH AND SOCIAL NEEDS ON THE JOB ENRICHMENT PRO--ETC(U)
SEP 77 D M HORSTMAN, J J KOTZUN

UNCLASSIFIED AFIT-LSSR-9-77B NL

3 OF 3
AD A047137

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1-78
DDC

Core Dimension	1. Enriched Team	2. Unenriched Team	3. Enriched Individual	4. Unenriched Individual	F	Significance	Significantly Different Cells*
	Experimental Cell - Means						
Skill Variety	2.0	1.125	2.0	1.556	.96	n.s. (.43)	None
Task Identity	7.0	1.75	4.95	3.33	12.4	.0001	1>3>4>2
Task Significance	1.125	4.75	1.95	3.00	6.87	.002	2>4>3>1
Autonomy	2.875	2.625	4.55	3.111	1.44	ns(.26)	None
Feedback	3.625	2.0	3.65	1.889	1.82	ns(.17)	None
MPS - mean	31.2	16.0	54.9	12.5	3.47	.032	3>1>4>2
MPS - range	4.0-75.8	1.5-39.7	1.5-136.5	5.3-29.3			
MPS - standard deviation	31.4	16.9	43.6	7.3			

*Any cells not underscored by the same line *are* significantly different. Any cells underscored by the same line are *not* significantly different. Alpha significance value is .05.

BIBLIOGRAPHY

Alderfer, C. P. Existence, relatedness, and growth. New York: The Macmillan Company, 1972.

Alderfer, C. P. Job enlargement and the organizational complex. Personnel Psychology, 1969, 22, 418-426.

Alderfer, C. P., Kaplan, R. E., & Smith, K. K. The effect of variations in relatedness need satisfaction on relatedness desires. Administrative Science Quarterly, 1974, 19, 507-526.

Beer, M. Needs and need satisfaction among clerical workers in complex and routine jobs. Personnel Psychology, 1968, 21, 209-220.

Brief, A. P., & Aldag, R. J. Employee reactions to job characteristics: A constructive replication. Journal of Applied Psychology, 1975, 60, 182-186.

Brown, G. Personnel problems facing the services. (An address to the Women's Forum on National Security), quoted by the Air Force Times, March, 1977.

Budd, J. M. Employee motivation through job enrichment. Journal of Systems Management, 1974, 25, 34-38.

Champoux, J. E. A moderated regression analysis of growth need strength in the Hackman-Oldham theory of job design. Unpublished technical report, unnumbered, University of New Mexico, 1976.

Clark, L. D., & Coughill, R. M. Job enrichment--an application. Unpublished research report, Air Command and Staff College, Air University, Maxwell AFB, Alabama, 1976.

Crooch, D. K. Do more with less: Job enrichment may be the answer. Air University Review, 1976, 27, 55-61.

Emory, C. W. Business research methods. Homewood, Ill.: Richard D. Irwin, Inc., 1976.

Ericksen G. L. Scientific inquiry in the behavioral sciences. Glenview, Ill.: Scott, Foresman and Company, 1970.

Farr, J. L. Personal interview. State College, Pennsylvania. February 21, 1977.

Farr, J. L. Task characteristics, reward contingency, and intrinsic motivation. Organizational Behavior and Human Performance, 1976, 16, 294-307.

Ford, R. N. Job enrichment lessons from AT&T. Harvard Business Review, 1973, 51, 96-106.

Fromkin, H. L., & Streufert, S. Laboratory experimentation. In M. E. Dunnette (ed.), Handbook of industrial and organizational psychology. Chicago: Rand McNally College Publishing Company, 1976.

Goldhaber, G. M. Organizational communication. Dubuque, Iowa: Wm. C. Brown Company, 1974.

Hackman, J. R. Is job enrichment just a fad? Harvard Business Review, 1975, 53, 129-138.

Hackman, J. R., & Lawler, E. E. Employee reactions to job characteristics. Journal of Applied Psychology, 1971, 55, 259-286.

Hackman, J. R., & Morris, C. G. Group tasks, group interaction process, and group performance effectiveness: A review and proposed integration. In L. Berkowitz (Ed.), Advances in experimental social psychology, vol. 8. New York: Academic Press, Inc., 1975.

Hackman, J. R. & Oldham, G. R. Development of the job diagnostic survey. Journal of Applied Psychology, 1975, 60, 159-170.

Hackman, J. R., & Oldham, G. R. Motivation through the design of work: Test of a theory. Organizational Behavior and Human Performance, 1976, 16, 250-279.

Hackman, J. R., Oldham, G. R., Janson, R., & Purdy, K. A new strategy for job enrichment. California Management Review, 1975, 17, 57-71.

Herzberg, F. One more time: How do you motivate employees? Harvard Business Review, 1968, 46, 53-62.

Herzberg, F., & Rafalko, E. A. Efficiency in the military: Cutting costs with orthodox job enrichment. Personnel, 1975, 52, 38-48.

Hulin, C. L., & Blood, M. R. Job enlargement, individual differences, and worker responses. Psychological Bulletin, 1968, 69, 41-55.

Huse, E. F., & Bowditch, J. L. Behavior in organizations. Reading, Mass.: Addison-Wesley Publishing Co., 1973.

Imparato, N. Relationship between Porter's need satisfaction questionnaire and the job descriptive index. Journal of Applied Psychology, 1972, 56, 397-405.

Kast, F. E., & Rosenzweig, J. E. Organization and management: A systems approach. New York: McGraw-Hill Book Company, 1974.

Lawler, E. E. Job design and employee motivation. Personnel Psychology, 1969, 22, 426-435.

Lawrence, F. P. Personal interview. Air Force Institute of Technology, Wright-Patterson AFB, Ohio, January 25, 1977.

Mankoff, A. W. Values - not attitudes - are the real key to motivation. Management Review, 1974, 63, 23-29.

Mills, T. Human resources - why the new concern? Harvard Business Review, 1975, 53, 120-134.

Morano, R. A. A new concept in personnel development and employee relations. Personnel Journal, 1974, 53, 606-611.

Nemiroff, P. M., & Ford, D. L. Jr. Task effectiveness and human fulfillment in organizations: A review and development of a conceptual contingency model. Academy of Management Review, 1976, 1, 69-82.

Nie, N. H., Hull, C. C., Jenkins, J. G., Steinbrenner, K., & Bent, D. H. Statistical package for the social sciences. New York: McGraw-Hill Book Company, 1975.

O'Dell, J. W. Group size and emotional interaction. Journal of Personality and Social Psychology, 1968, 8, 75-78.

Pierce, J. L., & Dunham, R. B. Task design: A literature review. Academy of Management Review, 1976, 1, 83-97.

Porter, L. W., Lawler, E. E., & Hackman, J. R. Behavior in organizations. New York: McGraw-Hill Book Company, 1975.

Riske, R. M., & Savioe, O. P. Job enrichment - for supply? Unpublished research report, Number M-35582-7-U, Air Command and Staff College, Air University, Maxwell AFB, Alabama, 1976.

Roche, W. J. & MacKennion, N. L. Motivating people with meaningful work. Harvard Business Review, 1970, 48, 97-110.

Schutz, W. C. Interpersonal underworld. Harvard Business Review, 1958, 36, 123-135.

Schutz, W. C. The interpersonal underworld. Palo Alto, Cal.: Science & Behavior Books, Inc., 1958.

Seybolt, J. W. Work satisfaction as a function of the person-environment interaction. Organizational Behavior and Human Performance, 1976, 17, 66-75.

Sims, H. P., & Szilagyi, A. D. Job characteristic relationships: Individual and structural moderators. Organizational Behavior and Human Performance, 1976, 17, 211-230.

Smith, P. C., Kendall, L. M., & Hulin, C. L. The measurement of satisfaction in work and retirement: A strategy for the study of attitudes. Chicago: Rand McNally, Inc., 1969.

Steers, R. M., & Braunstein, D. N. A behaviorally-based measure of manifest needs in work settings. Journal of Vocational Behavior, 1976, 9, 251-266.

Steers, R. M., & Spencer, D. G. The role of achievement motivation in job design. Unpublished technical report, No. 10, University of Oregon, 1976.

Steiner, I. D. Group processes and productivity. New York: Academic Press, 1972.

Stone, E. F., Mawday, R. T., & Porter, L. W. Higher order need strengths as moderators of the job scope, job satisfaction relationship. Unpublished technical report, No. 567, Purdue University, 1976.

Umstot, D. D. An experimental study of the effects of job enrichment and task goals on satisfaction and productivity. Unpublished doctoral dissertation, University of Washington, 1975.

Umstot, D. D., Bell, C. H. Jr., & Mitchell, T. R. Effects of job enrichment and task goals on satisfaction and productivity: Implications for job design. Journal of Applied Psychology, 1976, 61, 379-394.

Vroom, V. H. Work and motivation. New York: Wiley & Sons, 1964.

Walton, R. E. How to counter alienation in the plant. Harvard Business Review, 1972, 50, 70-81.

Wanous, J. P. Individual differences and reactions to job characteristics. Journal of Applied Psychology, 1963, 47, 15-23.

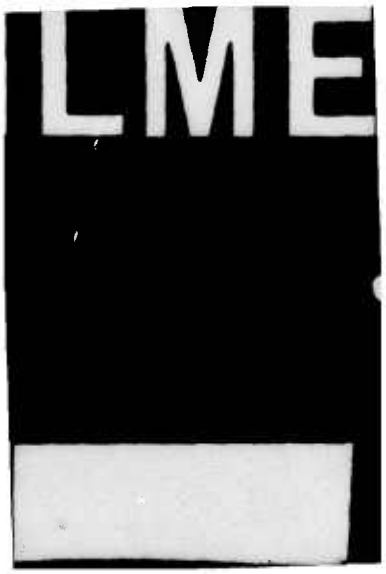
Why do they join the Air Force? TIG Brief, August 29, 1975, 21-22.

Winer, B. J. Statistical principles in experimental design. New York: McGraw-Hill Book Company, 1962.

Work in America. Report of a special Task Force to the Secretary of Health, Education, and Welfare. Cambridge, Mass.: The MIT Press, 1973.

Yalon, I. D. The theory and practice of group psychotherapy. New York: Basic Books, Inc., 1970.

Zierden, W. E. Interactive effects of subordinate growth needs, management style, and job structure on job related satisfactions. Unpublished technical report, No. DSWP-76-01, University of Virginia, 1976.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