

THE IMPACT OF GOAL SETTING AND FEEDBACK ON THE
PRODUCTIVITY OF NAVY INDUS. (U) NAVY PERSONNEL RESEARCH
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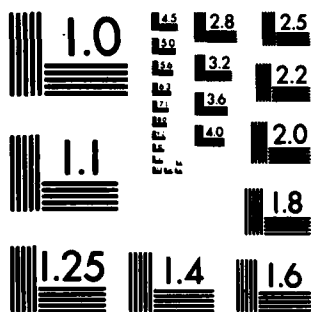
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Table 1

Demographic Characteristics of Workers in the
Experimental and Comparison Groups

Variable	Experimental Group (N = 124)	Comparison Group (N = 117)
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January 1983

**THE IMPACT OF GOAL SETTING AND FEEDBACK ON THE
PRODUCTIVITY OF NAVY INDUSTRIAL WORKERS**

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workers who were initially low performers than on those who were initially high performers. It was recommended that NARFs consider using the newly developed performance measurement system for goal setting and feedback as well as to provide worker efficiency data for their performance appraisal programs.

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FOREWORD

This research and development was conducted in support of task area Z1169PN.01 (Civilian Productivity Enhancement) under the sponsorship of the Chief of Naval Material Productivity Management Office and the Naval Air Logistics Command. Additional support was provided under a task order from the Naval Air Rework Facility, Alameda, California.

This report describes the use of goal setting and feedback with a newly developed individual-level performance measurement system. The development and design of this system will be described in greater detail in a future technical report.

Portions of this report were presented at the 42nd Annual National Meeting of the Academy of Management held in New York, New York, 15-18 August 1982.

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The purpose of this study was to evaluate the effectiveness of a goal setting and feedback system in improving worker motivation and productivity. The study was conducted in a manufacturing environment where workers were assigned to different production shops. The study was designed to compare the performance of workers in the experimental group (who received the goal setting and feedback system) with the performance of workers in the comparison group (who did not receive the system). The study was conducted over a period of 12 weeks, during which time the performance of workers in both groups was monitored and compared.

Summary

The objective of this effort was to implement and evaluate a goal setting and feedback system in a manufacturing environment. The system was designed to improve worker motivation and productivity by providing a clear, measurable goal for each worker and providing feedback on their performance. The system was implemented in a manufacturing environment where workers were assigned to different production shops. The study was designed to compare the performance of workers in the experimental group (who received the goal setting and feedback system) with the performance of workers in the comparison group (who did not receive the system).

Method

The first step was development of a computerized work measurement system that used existing data from a NASA management information system to produce individual worker performance reports. Next, 22 engine division production shops, each supervised by its own foreman, were selected for the study. Half the shops were designated as an experimental group; and the other half, as a comparison group. The foremen of the experimental shops were trained in goal setting. They were trained to assign performance goals to subordinates; and the remaining five, to set goals participatively with subordinates.

The 11 experimental group foremen met individually with their subordinates to assign a challenging performance goal or arrive at such a goal participatively. Different workers had different goals based on their ability, motivational level, and current performance. Workers in the goal-setting shops received a weekly report of their individual current performance level. In addition, these workers met with their foremen individually every 2 to 4 weeks to discuss progress toward their goals and possible problems. The effectiveness of the goal-setting intervention was assessed by comparing the two groups' performance during an 18-week baseline period with that during a 12-week test period after implementation of goal setting and feedback.

Results

1. Workers in the experimental shops showed significant improvements in performance after goal setting was implemented when compared to workers in the comparison shops. The goal-setting intervention had no negative or positive effect on the job satisfaction of workers.
2. No differences were found between assigned and participative goal-setting groups.

4. Further studies on goal setting should not provide more information on the effects of goal setting on worker job satisfaction and on the effects of goal setting on worker performance.

Conclusions

1. Goal setting and feedback can be used to improve worker efficiency in Navy industrial organizations without apparent effect on worker job satisfaction.
2. The amount of performance improvement is related to the difficulty of established goals but not to the method by which goals are set. Goal setting was more effective with low performers than with high performers.
3. The existence of established performance standards tends to keep both foremen and workers from setting challenging goals.
4. Establishing a goal-setting program in a Navy industrial organization requires resolving a number of difficult implementation issues.

Recommendations

1. Navy industrial commands should consider using goal setting and feedback as a motivational technique to improve worker performance.
2. NARPs should consider using the newly developed performance measurement system to provide worker efficiency data for the command's performance appraisal program.
3. Navy industrial commands should explore new ways of ensuring that workers do not view engineered time standards as limits on their performance capability.
4. More research is needed to better understand (a) the process of implementing effective goal-setting programs, (b) the limitations of using goal setting with high performing employees, and (c) the effects of long-term goal-setting programs.

CONTENTS

	Page
INTRODUCTION	1
Problem	1
Purpose	1
Background	1
Goal Setting Theory	2
Feedback	2
Goal Acceptance	2
Goal Setting in Industrial Organizations	3
Hypotheses	4
APPROACH	4
Research Design	5
Sample	5
Performance Measurement	5
Goal Setting and Feedback Training	7
Top Managers	7
Middle Managers	7
Foreman Training	7
Data Collection	8
Performance Data	8
Goal Information	9
Job Satisfaction	10
Structured Questionnaires/Interviews	10
Research Measures Summary	11
Data Analyses	11
RESULTS AND DISCUSSION	12
General Effectiveness of Goal Setting	12
Performance Change	12
Participative Versus Assigned Goals	13
Goal Difficulty	14
Goal Acceptance	16
High Versus Low Performers	17
Performance Change	18
Goal Difficulty	19
Goal Acceptance	20
Possible Reasons for Differences Between High and Low Performers	20
Job Satisfaction	20
Perceived Effectiveness of Goal Setting Program	22
Workers	22
Foremen	22
Program Implementation Issues	23
CONCLUSIONS	23

	Page
RECOMMENDATIONS	24
REFERENCES	25
APPENDIX A--ALTERNATIVE EXPLANATIONS FOR THE EXPERIMENTAL WORKERS' PERFORMANCE IMPROVEMENTS	A-0
APPENDIX B--IMPLEMENTATION ISSUES	B-0
DISTRIBUTION LIST	

LIST OF TABLES

	Page
1. Demographic Characteristics of Workers in the Experimental and Comparison Groups	6
2. Summary of Research Measures	11
3. Mean and Adjusted Performance Efficiency Scores	13
4. Relationship Between Goal Difficulty and Performance Change for Workers in the Experimental Groups	15
5. Degree of Performance Change at Different Levels of Goal Difficulty	16
6. Relationship Between Goal Acceptance and Performance Change for Workers in the Experimental Groups	17
7. Mean Performance Efficiency Scores for High and Low Performers	18
8. Mean Goal Difficulty, Goal Acceptance, and Performance Change for Experimental High and Low Performers	19
9. Mean Job Satisfaction Scores for Experimental and Comparison Groups During the Baseline and Test Periods	21
10. Perceived Value of the Goal-setting and Feedback Program as Seen by the Workers (<u>N</u> = 101)	22
11. Perceived Effect of the Goal-setting and Feedback Program as Seen by Experimental Shop Foremen (<u>N</u> = 10)	23

INTRODUCTION

Problem

Improving productivity within the Navy industrial community is a continuing concern at all levels within the Navy Material Command. While attention is being directed at hardware related initiatives such as capital investment and technological improvements, commands are also becoming more aware of the role of worker motivation in productivity. There is a need to evaluate the usefulness of strategies and techniques aimed at enhancing productivity through improved worker motivation.

Purpose

The purpose of this effort was to implement and evaluate a feedback and goal-setting program for industrial workers at a naval air rework facility (NARF). This program attempted to improve worker motivation and productivity through integrating an improved work measurement system with goal setting and performance feedback for individual workers. Both assigned and participative goal settings were used in order to assess their relative effectiveness.

Background

There is growing concern in the United States with what has been labeled the "U.S. Productivity Crisis" (Newsweek, 1980). This crisis is manifested in the declining rate of growth in the output per hour of labor. The United States finished well behind six other industrial nations in productivity increases from 1968 to 1978 (Bureau of Labor Statistics, 1979).

Within the Navy, concern over worker productivity has created increasing interest in productivity improvement at all levels of the organization. Indicative of this interest is an instruction issued by the Chief of Naval Material that outlines a productivity enhancement program for the Navy industrial community.¹ One objective of this instruction is to encourage the implementation of new initiatives that may enhance productivity. A recent conference on productivity and work motivation in the military services also recommended that productivity experimentation and inventiveness be encouraged in military organizations (Nebeker, Broedling, & Doherty, 1978). Conference attendees concluded that such experimentation could result in the identification of productivity programs and techniques that may have wide application.

Traditionally, productivity programs in both the military and civilian sectors have centered on technological improvements and capital investments. While the importance of these hardware-oriented approaches is obvious, there is a growing body of organizational literature that suggests that significant productivity improvements can be realized through improved worker motivation (Greiner, Hatry, Koss, Millar, & Woodward, 1981). Several different techniques have been investigated, including autonomous work groups, job restructuring, participative management, and monetary incentive systems. Each of the above approaches has been shown to have merit under differing circumstances (Cummings & Molloy, 1977; Patten, 1977).

¹Chief of Naval Material Instruction 5200.42; subj: Naval Material Command productivity enhancement program, Washington, DC, 30 July 1979.

Another approach that organizational research has demonstrated to be especially promising for improving worker motivation is goal setting and feedback. A review by Locke, Feren, McCaleb, Shaw, and Denny (1981) found strong support for the positive impact of goal setting on work performance. Locke et al. reported that the median degree of performance improvement in field studies that used goal setting was approximately 16 percent. Based on such results, Latham and Locke (1979, p. 80) have called goal setting "a simple, straightforward, and highly effective technique for motivating employee performance."

Goal Setting Theory

Locke (1968) proposed that, if a goal is accepted by an individual, the more difficult or challenging the goal, the higher the level of performance. In addition, Locke argued that the greater the extent to which goal accomplishment can be measured (i.e., the specificity of the goal), the better the performance. Both of these statements combine to form the single proposition that specific, hard goals (if accepted) should result in better performance than either generalized goals (e.g., "Do your best") or no goals.

The research support for the above proposition is overwhelmingly positive. Locke, Shaw, Saari, and Latham (1981) reported that 24 field experiments during the period between 1969 and 1980 consistently found that individuals given specific, hard goals outperformed individuals who were either trying to do their best or who did not have goals. In general, these findings are contingent upon two factors--feedback and goal acceptance.

Feedback

Locke (1968) suggested that performance feedback can increase effort and performance through goal setting in three ways: (1) it can induce a person who previously did not have a goal to set one, (2) it can induce a person to raise his goal after achieving a previous goal, and (3) it can inform a person that he needs to increase his effort level because the current level is not sufficient to attain his goal. In each of these cases, feedback affects performance because it allows individuals either to set new goals or assess progress toward old goals.

A number of recent studies suggest that feedback is a necessary condition for goals to affect performance (Becker, 1978; Erez, 1977; Shaw, Locke, Bobko, & Beitzell, 1981). Hard specific goals alone, without feedback on progress toward these goals, will not result in performance improvement. These findings indicate that organizations implementing goal-setting programs must have a reliable performance measurement system. This system must provide the accuracy necessary for setting specific goals while at the same time generating periodic performance data that can be fed back to workers on a regular basis.

Goal Acceptance

While systematic feedback must be an integral part of a goal-setting program, perhaps the most fundamental prerequisite is that workers accept the goals. Goal acceptance is perhaps the most critical concept in goal-setting theory since it implies that workers are willing to commit themselves to achieving a goal. Most goal-setting studies have found a high level of goal acceptance by workers who participated in the research effort. Locke (1981) has stated that he has been surprised at the ease with which employees accept performance goals. He felt that this may be due in part to the demand characteristics of the job; that is, employees have a mental set that includes accepting reasonable performance goals set with or assigned by their supervisor.

In this sense, the authority of the supervisor may often be sufficient to ensure goal acceptance. Nonetheless, Locke (1981) suggested that this authority is not unlimited and that goal acceptance may also depend on: (1) the fairness and difficulty of the goal, (2) the employee's trust of management, (3) the perceived legitimacy of the supervisor's demands, and (4) the values and personal aspirations of the employee. Given that these factors could affect goal acceptance, it would seem that goal-setting theory is subject to boundary conditions that will limit its applicability to certain populations and places (Miner, 1980). Thus, the potential value of goal setting must be assessed in relation to the organizational context in which it would be implemented.

Goal Setting in Industrial Organizations

The current study was concerned with implementing and evaluating the use of goal setting and feedback with industrial production workers. More specifically, the organizational site was a production division within a NARF. As in many industrial organizations, the NARF makes extensive use of engineered and estimated performance standards. These standards represent the time in which a trained employee working at a normal pace would be expected to complete a given task. They are usually based on time and motion studies or on other industrial engineering methods. While these standards are used for advance cost estimates, manpower projections, and other planning requirements, they also serve another implicit function--they establish acceptable performance levels for workers (Maynard, 1971). In this sense, a standard is a goal for workers to try to achieve (Locke, 1978).

If achieving standards represents an acceptable performance level, then industrial organizations such as NARFs that make extensive use of task standards may encounter problems in implementing goal-setting programs for workers. The basic proposition of goal-setting theory states that there is a positive relationship between the difficulty of an accepted task goal and level of performance on the task (Locke, 1968). Likewise, considerable research has shown that hard, specific goals (if accepted) result in performance improvements (Locke, Shaw, Saari, & Latham, 1981). However, while performance standards certainly define specific goals, they may not always be difficult goals. Performing at standard level may be challenging for employees with low ability and work motivation, but it would not represent a challenging goal for a motivated and highly skilled employee. The objective of a goal-setting program is to establish specific, challenging goals for all workers. Individuals are encouraged or required to have different goals, dependent on their current motivation and performance level. The problem with goal setting in an organization using industrial standards is that the organization is sending mixed messages. The supervisor is trying to establish a challenging goal for the worker (often above standard performance level) while the organization has previously defined standard performance as acceptable.

One means of addressing the above problem is by focusing on the manner in which goals are established. The supervisor could either assign performance goals or set them during a participative interaction with the subordinate. If the supervisor assigns the goal, it could be set based on current performance independent of existing standards. Research has shown that if goal difficulty is held constant, equal goal acceptance and performance improvements are obtained, regardless of whether these goals were assigned or set participatively (Dossett, Latham, & Mitchell, 1979; Latham & Saari, 1979; Latham, Steele, & Saari, 1981). However, there is some evidence to suggest that, when an organization uses participative and assigned goal setting with different groups, participative goal setting may result in more difficult goals (Latham & Yukl, 1975; Latham, Mitchell, & Dossett, 1978). These more difficult goals would then be expected to result in greater performance increases. In order to compare the relative effectiveness of these

methods of setting goals, the current study used both assigned and participative goal setting with the NARF industrial workers.

While the best means of setting goals remains unclear, there is one subgroup of workers who might be expected to improve more as the result of a goal-setting program in an industrial organization--low performers. Individuals who are currently performing below standard are not faced with conflicting messages when higher performance goals are established by or with their supervisor. In addition, it is possible that low performers are less likely to understand task requirements or to have personal performance goals than are high performers. Thus, it seems reasonable to expect a goal-setting intervention with production workers to have its greatest impact on low performers. One recent study supports this contention for nonproduction workers. Pritchard, Bigby, Beiting, Coverdale, and Morgan (1981) found that, for data transcribers, goal setting and feedback had a positive impact on low performers but no impact on high performers. They argued that, since the treatment was designed to increase motivation and since the high performers were probably already motivated, the treatment had little impact on them.

Hypotheses

Based on the research literature reviewed in the previous sections, the following hypotheses were generated for the current study:

1. Workers in the goal-setting groups will show greater performance improvements than will workers in comparison groups.
2. The more difficult the worker's performance goal, the greater will be the degree of performance improvement.
3. Workers who set goals participatively will choose more difficult goals and show greater goal acceptance and performance improvements than will workers who are assigned goals.
4. Low performers will have more difficult goals (relative to their initial performance levels) and show greater performance improvement than will high performers.

APPROACH

NARF, Alameda, California, which employs over 6,000 civil service workers, was selected as the research site. Its mission is to provide major maintenance on naval aircraft, including the repair and overhaul of aircraft engines, components, and accessories. NARF has a management information system providing data that could be used to generate weekly individual employee performance measures.

The power plant division of the production department was selected for the experimental goal-setting program because NARF managers felt that this division has the best performance standard coverage and would therefore lend itself to the most accurate work measurement. Twenty-two production shops in four sections of the power plant division were selected for the study. Each shop is supervised by its own foreman. For the most part, the individuals in each shop work alone on assigned tasks although there is some need to share information and cooperate on larger tasks.

Research Design

The research design was basically quasi-experimental (see Cook & Campbell, 1976). Workers in 2 engine division production sections composed of 11 shops were to serve as the experimental group; and those in the remaining 2 sections with 11 shops, as the comparison group. Of the experimental group, the workers in the 5 shops in one section were to be involved in participative goal setting; and those in the 6 shops of the other section, in assigned goal setting. The total time period for the study was 40 weeks: a baseline of 18 weeks followed by a 22-week experimental period after implementation of goal setting and performance feedback.

Sample

The sample was to include all permanent blue collar workers assigned to the 22 shops included in the research design; shop foremen, temporary workers, and apprentices were excluded. However, participation in the experimental group was voluntary, and five workers refused to participate. This resulted in a final sample of 241 workers--124 in the experimental group and 117 in the comparison group. In the experimental group, 67 workers were involved in participative goal setting; and 57, in assigned goal setting.

Workers in the sample tended to be permanent members of their individual shops with roughly 2 to 4 years of formal and/or on-the-job training. Their tenure at NARF ranged from 2 to 30 years and their yearly earnings varied from approximately \$18K to \$30K, depending on tenure, wage grade level, and amount of overtime. Additional demographic data for the experimental and comparison groups are presented in Table 1. As can be seen, there was very little difference between the demographic characteristics of the experimental and comparison shop workers. Overall, these workers could be characterized as predominantly middle-age males with a high school education.

Performance Measurement

The development of an individual-level performance measurement system was a basic requirement for implementing the goal-setting program for three reasons. First, the performance measure would provide the critical data used by employees and supervisors to set specific, measurable goals. Second, the measurement system output could be used to give participants feedback concerning their progress toward achieving goals. Finally, the measurement system could provide data to test hypotheses and to assess the overall impact of the program on worker productivity.

NARFs use in-shop transactors to collect labor data inputs for a computerized management information system (MIS). Upon completing a task, a worker transacts that information to a central computer. The computer calculates the time the worker spent on the task and makes a MIS record of the transaction that includes identification of the employee, task, time spent, and standard time for completing the task.

Using these existing data, an individual performance measurement system was developed that provided a weekly performance report to the workers in the experimental sections. This report included a performance measure indicating how well the employee performed against standards on all tasks completed in both the previous 1-week and 4-week periods. The report also provided information on overtime, leave usage, and time spent on nonproduction activities such as training and cleanup. A coded number rather than the worker's name was used to identify the report to help ensure anonymity. Copies of each worker's report were available only to the worker, the shop foreman, and the

Table 1
Demographic Characteristics of Workers in the
Experimental and Comparison Groups

Variable	Experimental Group (N = 124) %	Comparison Group (N = 117) %
<u>Age:</u>		
18-25	6	3
26-35	24	28
36-45	22	24
46-55	28	29
56 and Over	20	16
<u>Sex:</u>		
Male	92	96
Female	8	4
<u>Race:</u>		
Black	34	22
Spanish	11	8
Oriental	2	13
White	51	50
Other	2	7
<u>Education:</u>		
Some high school	19	19
High school	59	44
Some college	18	27
Associate degree	4	7
Bachelors degree	0	3
<u>Grade Level:</u>		
WG-5	10	15
WG-8	25	12
WG-9	21	16
WG-10	44	57

research staff. In addition, backup reports were available for the foremen to use in verifying information in the individual reports.

The performance measure or efficiency score was calculated by taking the ratio of the total standard time earned for all tasks completed by the worker in a given week (or 4 weeks) to the total time spent by the worker on those same tasks. This figure was then multiplied by 100. Thus, a score of 100 meant that, on the average, an individual completed work in exactly the standard time allocated by the organization. Scores higher

than 100 indicated performance better than standard and those lower than 100, performance below standard.

Goal Setting and Feedback Training

Training activities occurred at three different hierarchical levels: (1) top managers, (2) middle managers, and (3) foremen in the experimental shops. The objective of all the training was to provide and exchange information about the goals and objectives of the program. Wherever possible, attempts were made to ensure that topics were covered on more than one occasion to increase the probability of accurate exchange and understanding.

Top Managers

Numerous one-on-one meetings were held with the commanding officer (CO), production department head, and other key NARF people during the year of developmental activities prior to implementation of the program. These exchanges were formalized through the establishment of a productivity steering group that included the CO, key department heads, a representative from the Navy Personnel Research and Development Center (NAVPERSRANDCEN), and the president of the union. Starting approximately 6 months before implementation, the group met monthly to discuss progress, provide guidance, and make decisions on important aspects of the goal-setting program.

At these monthly meetings, top managers heard about the project's status and were "trained" on the basic principles underlying goal setting and feedback. The union agreed to support the project as long as it was voluntary for workers. The steering group continued to meet during the implementation and evaluation phases of the project.

Middle Managers

Starting about 2 months before goal-setting implementation, middle managers in the engine division were briefed on the objectives of the study. Supervisors of the foremen in the experimental group were told about the program's time and resource requirements. Supervisors of foremen in the comparison group were told to conduct "business as usual" and to tell their foremen only that the experimental shops were testing the feasibility of a new performance measurement system for workers.

Foreman Training

During the 3 months before goal setting started, researchers met one-on-one with each of the 11 experimental group foremen to discuss the new performance measurement reports. Based on these discussions, a few minor changes were made to the format of the employee performance report. The foremen were asked not to discuss the program with their workers until it was formally implemented.

During the week prior to beginning of formal goal setting, the experimental group foremen received 2 days of training on goal setting and feedback. The foremen who were to assign goals met as a group, as did those in the participative condition. Training during the first day stressed the basic principles of goal setting and feedback and the key role of the foreman in this subordinate/supervisor interaction.

The second day of training dealt with the details required to implement goal setting in their shops. This training introduced the concept of a formal performance feedback

meeting as a private occasion for the worker and foreman to discuss goals, performance trends, and performance problems.

A schedule for the performance feedback meetings was also presented on the second day of foreman training. During the first 2 months, foremen were to meet individually with each of their subordinates bi-weekly to discuss performance trends. For the following months, these meetings were to be held monthly. During the first and second meetings, the foremen in the participative group were requested to arrive jointly at a performance goal with each subordinate. The foremen in the assigned group were asked to decide on goals for each of their subordinates prior to the first meeting and assign them to the workers at that meeting. Both groups of foremen were requested to arrive at specific performance score goals that the worker could potentially perform at during the upcoming 6 months. These goals were to be challenging but achievable. The foremen were told to use information on the individual's past performance, level of motivation, training, and work assignment in arriving at the goal. They were asked to keep records of the performance feedback meetings and to record goals on a NARF form provided for their use. Additionally, the foremen were to distribute the individual worker performance reports every week.

During the 22-week experimental period, researchers met one-on-one with foremen approximately every 3 weeks. Problem areas were discussed and goal setting and feedback principles were further emphasized during these meetings.

One of these problems deserves particular mention. The foremen had been asked to arrive at a personally tailored goal for each subordinate. The aim was to arrive at a challenging but fair goal that the worker would accept. The foremen had no problem with this concept for workers generally performing below standard (i.e., the 100 performance score). However, some were initially resistant to the notion of setting challenging goals for workers who were already performing at or above standard. They felt that these employees were already doing more than should be expected of them. The researchers tried to stress the role of the foreman in helping workers achieve potential rather than average performance. The foremen agreed that their role was to motivate employees and that they would give the program a fair chance. Nonetheless, it was clear to the researchers that the foremen personally felt that asking for challenging goals for high performers would be a difficult idea to sell to these subordinates.

Data Collection

Performance Data

Individual-level performance data were routinely generated by the performance measurement system and provided to the workers during the experimental period in the weekly individual performance reports. Performance data were also collected on computer tapes by the researchers for the 18-week baseline period prior to beginning the goal setting and feedback, and for the 22-week test period after program implementation.

For the purpose of the current study, two aggregate performance efficiency scores were generated for each worker in the experimental and comparison shops. The first score represented the worker's performance efficiency during the 18-week baseline while the second score represented the 22-week test period performance. For both periods, these efficiency scores represented the ratio of the total standard time for tasks completed during that period to the total time spent on those tasks. This figure was then multiplied by 100. All time an individual spent in nondirect labor categories (e.g., leave, training, cleanup) was excluded from the computation. In essence, these two scores were

measures of worker productive efficiency during the baseline and test periods. An increase in performance from 100 to 110 represented a 10 percent increase in efficiency.

A number of the hypotheses addressed the issue of degree of performance change or improvement from the baseline to the test period. For this reason, a "performance change" measure was generated by creating a score that was the difference between the test period and baseline performance scores. If there were no improvement, a score of zero resulted. Increases in efficiency yielded positive change scores while decreases in efficiency generated negative scores.

A final concern related to performance scores was the operationalization of the constructs of high and low performers. These workers were identified based on their performance during the baseline period. While the distribution of baseline scores could be broken into numerous categories (e.g., top and bottom half, quartiles, etc.), one categorization made the most sense from both the organization's and researchers' points of view. That was defining low performers as individuals who were performing below 100 and high performers as employees who were performing at 100 or above. Since performance at standard efficiency defined an acceptable level for the organization, it seemed the most reasonable point at which to divide the sample.

Goal Information

Performance goals were set and recorded for all workers in the experimental shops at the beginning of the 22-week experimental period. In a small number of instances, goals were changed during this test period. For these workers, the goal used in the analysis was computed by adding the original and modified goals together and dividing by two.

In order to test most of the hypotheses, a measure of goal difficulty was needed. The goal itself could not be used for this measure since, on the average, workers who had performed at high levels during the baseline period would be expected to have higher goals. Raw goal numbers would thus be confounded with ability (see Locke, Shaw, Saari, & Latham, 1981). For this reason, goal difficulty was defined as the difference between an individual's goal and his or her baseline performance. For example, a worker who had a goal of 120 and a baseline efficiency score of 110 would have a goal difficulty score of 10. One assumption in using such a measure is that improvements in efficiency are equally difficult at different efficiency levels. That is, an improvement from 70 to 80 is considered to be of the same difficulty as an improvement from 110 to 120. Obviously, this sometimes may not be the case, depending on the worker and the type of task. The foremen felt that very few of their subordinates were working at capacity and that the improvements they would ask for would be within the individual's capability (i.e., challenging but achievable). Given this condition, the definition of goal difficulty seemed reasonable. Also, other researchers have found that this type of objective measure of goal difficulty is often a better predictor of performance improvement than are subjective measures (see Yukl & Latham, 1978).

Considerable research has shown that, when goal acceptance is measured by asking goal-setting participants to respond to questionnaire items, these responses seldom relate to goal-setting effectiveness (Locke, Shaw, Saari, & Latham, 1981). The current study attempted to determine the usefulness of goal acceptance as measured from the supervisor's perspective. Structured interviews were conducted by NAVPERSRANDCEN personnel after the initial goal-setting sessions in order to solicit responses from foremen to these questions: (1) Did the subordinate react favorably to discussing his/her performance with you? (2) How did the subordinate respond to the idea of him/her working towards achieving his/her goal? (3) Did the employee agree to work toward

achieving the goal? The foreman's replies to each item were categorized into a response scale ranging from a low of 1 (no, did not like it) to 3 (yes, seemed to enjoy it). The three items were then combined to form a scale measuring goal acceptance as reported by the foreman. The three items were reasonably intercorrelated (average $r = .57$). The coefficient alpha for the scale was an acceptable .74 (see Cronbach, 1970).

Job Satisfaction

Specific hypotheses had not been generated concerning the impact of goal setting and feedback on the job satisfaction of the workers in the experimental groups. However, job satisfaction was still of interest for two reasons. First, Latham and Locke (1979) have argued that goal setting increases the challenge of the job. They also suggested that goal setting and feedback may provide workers with a sense of achievement, recognition, and accomplishment. As such, it might be expected that goal setting would increase intrinsic job satisfaction for workers. Second, increases and/or decreases in job satisfaction have important consequences for organizations in terms of their effects on absenteeism and turnover (Price, 1977).

The short form of the Minnesota Satisfaction Questionnaire (MSQ) (Weiss, Dawes, England, & Lofquist, 1967) was used to assess job satisfaction both before and after the goal-setting intervention. This scale contained 20 items representing various aspects of the job. Thirteen items measured intrinsic job satisfaction (e.g., autonomy, competence), while six items measured extrinsic job satisfaction (e.g., supervisor, organizational policies, pay). The response scale for the MSQ ranged from very dissatisfied (1) to very satisfied (5).

The MSQ was administered approximately 3 months before the goal setting began and repeated approximately 2 weeks before the end of the test period. This questionnaire was administered to workers in both the experimental and comparison shops. Because of scheduling problems, only 77 of the experimental workers or 62 percent completed the questionnaire during the first administration. For comparison group workers, 53 out of the possible 117 or 45 percent completed the first questionnaire. Twenty-five percent of the workers included in the final sample of this study had completed job satisfaction questionnaires during both the baseline and test periods. While this final 25 percent sample was much smaller than desired, the questionnaire data still provided useful trend information for assessing possible changes in job satisfaction as a function of being in a goal-setting program.

Structured Questionnaires/Interviews

The final data source was structured interviews conducted with foremen and individual workers. At the end of the second week after the goal-setting program had been initiated, structured interviews were conducted with all of the experimental group foremen. These interviews were held on a one-on-one basis and provided data about the foreman's perception of how the program was going as well as the goal acceptance data. During these interviews, questions and response categories were read to the foreman to ensure standardization across interviews.

Structured interviews were also conducted in a similar manner with workers in the experimental shops. These completely voluntary interviews were held the week after the end of the 22-week experimental period. They examined, among other things, the extent to which the program was viewed as being of use to the employee in his/her shop and the employee's perception of how much influence he/she had over the goal that was set. Interviews were completed with 81 percent of the 124 experimental group employees.

Research Measures Summary

Because of the large number of research measures used, a summary of the measures, including their source, is presented in Table 2. Where more than one item was used in a scale, the scale score represents a mean, or the sum of the individual items divided by the total number of items on the scale. If an individual was missing data on one or more items on the scale, the individual was considered to have missing data on the total scale. This procedure was used for all scales except the performance measurement scores. In this case, a requirement for inclusion in the study was that the worker have performance data during at least 60 percent of both the 18-week baseline and 22-week test periods. Hence, there were no missing data scores on the performance measures for workers included in the study. Given that different sources of data were used at different times, the number of respondents varied on different measures. For this reason, all tables presented later in the results section include the number of workers used in the particular analysis. Also, to ease both presentation and interpretation of data, all scales were computed such that higher scores represented more positive responses or stronger agreement. This required score reversal for all negatively worded items.

Table 2
Summary of Research Measures

Research Measure	Source	Scale Computation
A. <u>Performance Measurement</u>		
1. Baseline performance	NARF MIS	18-week average
2. Test performance	NARF MIS	22-week average
3. Performance change	NARF MIS	Test minus baseline performance
B. <u>Goals</u>		
4. Performance goal	Foremen	1 item
5. Goal difficulty	Foremen/MIS	Goal minus baseline performance
6. Goal acceptance	Foremen	3 items
C. <u>Job Satisfaction</u>		
7. Intrinsic	Workers	13 items
8. Extrinsic	Workers	6 items
9. Overall	Workers	20 items

Data Analyses

The research design employed in this study could best be labeled quasi-experimental. Such designs are common in field studies where individuals are already working in assigned groups (Cook & Campbell, 1976). Nonetheless, this type of design presented a unique problem when trying to decide whether the goal-setting treatment had an effect. This issue arose when contrasts were made between the experimental and comparison groups.

Since subjects were not randomly assigned to these groups, it was possible that the two groups differed on important characteristics prior to initiation of the treatment. Attempts to determine whether the treatment had an effect could be clouded by these pretreatment differences. A critical issue, therefore, was whether or not the workers in the experimental and comparison shops were significantly different on important variables prior to goal setting. Demographic data presented in Table 1 seemed to indicate that the two groups were extremely similar on a number of important demographic characteristics. However, the most critical variable for this study was worker efficiency. Performance goals were based on efficiency and a large part of the evaluation of impact rested on possible improvement in efficiency for workers in the experimental shops.

In order to control for differences in baseline performance between the experimental and comparison groups, analysis of covariance (ANCOVA) was used to test those hypotheses that addressed performance changes between the baseline and test periods. ANCOVA (see Huitema, 1980; McNemar, 1969) makes a statistical adjustment in the treatment effect by reducing the bias that is caused by differences between the groups before the treatment is administered. Since baseline performance data were available for both experimental and comparison subjects, these data could be used as the covariate. ANCOVA was therefore used to make adjustments in the test period performance scores to reflect any baseline period differences between groups. The ANCOVA F test was then used to test the null hypotheses that two or more adjusted population means were equal. Where more than two means were involved and a significant F ratio was obtained, it was necessary to perform follow-up tests to determine which means differed significantly from each other. Follow-up tests were made using Fisher's protected LSD procedure (see Huitema, 1980). Fisher's procedure has been shown to have power advantages over a number of alternative follow-up tests (Carmer & Swanson, 1973; Bernhardtson, 1975). ANCOVA procedures were also used in making comparisons concerning changes in job satisfaction. For these analyses, baseline satisfaction scores were used as the covariate.

RESULTS AND DISCUSSION

Before examining the impact of the goal-setting program, it was necessary to determine whether or not a crucial part of the foreman training had been effective. That is, whether workers in the participative group really perceived that they had more influence in the goal-setting process than workers who were assigned goals. In order to verify the treatment conditions, workers in both the assigned and participative groups were asked how much influence they had in the goal-setting process. Based on a scale ranging from 1 (a lot of say) to 4 (no say), workers in the participative shops reported a mean level of influence of 1.3, versus 3.0 (a little say) for the assigned workers. These means differed significantly ($t = 6.97, p < .001$). Consistent with the training objective, workers who participatively set goals felt that they had more influence in setting their performance goals than did workers who were assigned goals.

General Effectiveness of Goal Setting

The first set of analyses examined the impact of the goal-setting intervention on workers in general, independent of whether they were initially high or low performers.

Performance Change

It was hypothesized that the workers in the goal-setting groups would show greater performance improvements than would workers in the comparison group. The findings relevant to this hypothesis are presented in Table 3. As can be seen, workers in the

experimental group improved their performance efficiency scores by approximately 8.9 points, compared to only 2.9 points for the comparison workers. ANCOVA was then used to partially control for performance differences between the two groups during the baseline period. Results of the ANCOVA indicated that the goal-setting group was performing significantly better than the comparison group during the test period. Based on these adjusted test period scores, the workers with goals had a performance improvement score of 5.4 points relative to the comparison group. One alternative explanation for this improvement is that workers in the experimental group may have manipulated the work measurement system in order to create artificial performance improvements. This area is explored in Appendix A.

Table 3
Mean and Adjusted Performance Efficiency Scores

Group	Mean Performance Efficiency			Adjusted ^a Test Period	N
	Baseline (B) Period	Test (T) Period	Performance Change (T - B)		
Comparison	99.5	102.4	+2.9	101.7 ^{b,c}	117
Experimental	97.5	106.4	+8.9	107.1 ^b	124
Assigned goals	99.3	108.9	+9.6	108.3 ^c	57
Participative goals	96.0	104.4	+8.4	106.2 ^c	67

^aAdjusted to control for differences in baseline period performance.

^bFor the analysis contrasting the comparison and combined experimental groups, covariance F = 11.7, p < .001.

^cFor the analysis contrasting the comparison, assigned goals, and participative goals groups, covariance F = 6.2, p < .01.

These findings are consistent with a large number of other studies that have demonstrated the positive impact of goal setting on worker performance (e.g., see Latham & Yukl, 1975; Locke, Shaw, Saari, & Latham, 1981). However, the degree of improvement is considerably smaller than the 16 percent median performance improvements in experimental field studies of goal setting reviewed by Locke, Feren, McCaleb, Shaw, and Denny (1981). This is not to argue that an approximate 5 percent improvement is inconsequential but rather to suggest that contextual factors may have been operating that reduced the potential size of the impact on performance. This will be discussed in greater detail in the following sections.

Participative Versus Assigned Goals

It was also hypothesized that workers who set goals participatively would show greater improvements than would workers who were assigned goals. The results presented in Table 3 do not support this hypothesis. Follow-up tests indicated that both the assigned goal and the participative goal groups were performing significantly better (p < .05) than was the comparison group. However, no significant differences were found between the

levels of test period performance of the assigned and participative workers. Overall, the results from Table 3 suggest that both assigned and participative goal setting significantly improved worker performance and that both methods were equally effective.

To gain a better understanding of the changes in performance for the experimental groups, trend lines were plotted. Based on data combined for 4-week periods, Figure 1 presents trends for the baseline and test periods for the assigned and participative groups. Both groups reached their maximum performance level approximately half-way into the test period and then had slight declines in performance. Both groups were still performing better at the end of the test period than during any 4-week period in the baseline. Overall, the data suggest that goal setting improved performance during the entire test period; however, whether this improvement would be sustained across longer time periods could not be addressed using these data.

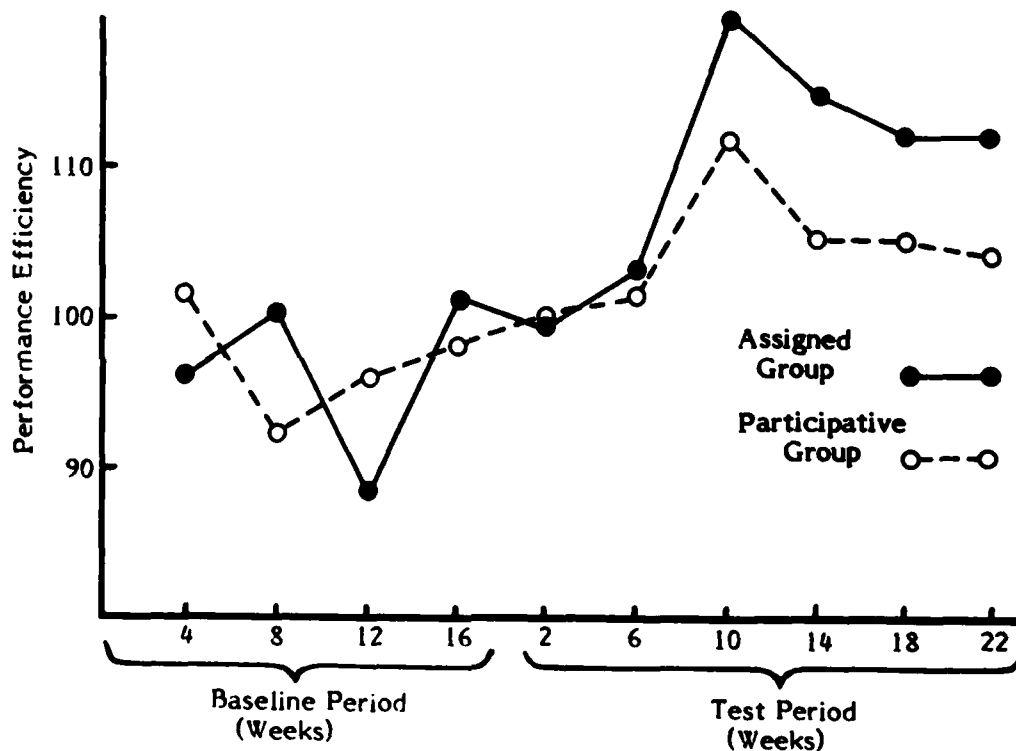


Figure 1. Performance trends before and after goal setting.

Goal Difficulty

It was hypothesized that the more difficult the worker's performance goal, the greater would be the degree of performance improvement. It was also argued that workers who set goals participatively would choose more difficult goals than would workers who were assigned goals by a supervisor. The results relevant to these hypotheses are presented in Table 4.

Table 4
Relationship Between Goal Difficulty and Performance
Change for Workers in the Experimental Groups

Experimental Group	Mean Goal Difficulty	Mean Performance Change	Correlation r	N
Assigned	11.0	9.6	.33*	57
Participative	5.5	8.4	.49**	63 ^a
Total	8.1	8.9	.40**	120

^aFour workers in the participative group refused to set goals but still wanted to receive feedback reports and meet with their foreman. These workers were included in the performance change analyses but not in the goal difficulty or correlational analyses.

*p < .01.

**p < .001.

As can be seen, there was a moderate but significant relationship ($r = .40$, $p < .001$) between the level of goal difficulty and the degree of performance change for the total experimental group. Significant results were also obtained when correlations were computed separately for workers in each of the two experimental groups. No support was found for the argument that participative workers would have more difficult goals. The direction of the difference was in the opposite direction, in fact, but was not statistically significant. Goals assigned by foremen were, on the average, 11 points higher than the baseline performance of their subordinates, whereas participative goals were 5.5 points higher.

To further understand the relationship between goal difficulty and performance change, the workers in both goal-setting groups were rank ordered and divided into three categories based on their level of goal difficulty. The mean level of performance change was then compared across these three groups. These means are presented in Table 5. Results of an analysis of variance (ANOVA) indicated that the level of performance change was significantly different across the three groups ($F = 13.9$, $p < .001$). As expected, the greatest mean performance change (17.3) was obtained for the group with the most difficult goals ($\bar{x} = 24.9$). Surprisingly, the mean goal difficulty level for workers in the lowest goal difficulty group was a negative 8.7. In other words, these workers had an average goal that was almost 9 points lower than their baseline performance. Since foremen had been told in the training sessions that goals were supposed to be challenging and difficult, it was not anticipated that workers would have goals lower than their baseline performance level. This finding implied that this aspect of the foreman training may not have been effective.

A comparison was also made between the actual goals set in the two experimental groups. Results indicated that 78 percent of the participative workers had a goal of 100 (or standard level of performance), compared to only 10 percent of the assigned workers. This difference in distributions of goals at or different than 100 across the two groups was statistically significant (chi square = 30.2, $p < .001$). It thus appeared that workers who

Table 5
Degree of Performance Change at
Different Levels of Goal Difficulty

Level of Goal Difficulty	Mean Goal Difficulty	Mean Performance Change	N
Low	-8.7	2.3	41
Medium	7.6	5.8	37
High	24.9	17.3	42

had some influence in their choice of goals preferred a goal equal to 100--the existing organizational standard. This may explain, at least in part, the curious existence of negative goals. Goals for many workers may have been set at standard irrespective of their baseline performance. For workers performing above standard during the baseline period, the result would have been negative goal difficulty scores.

In summary, strong support was thus found for the hypothesized role of goal difficulty. The findings are consistent with a large number of laboratory and field studies that have found a positive relation between goal difficulty and task performance (Locke, Shaw, Saari, & Latham, 1981). The fact that workers in the assigned group had more difficult goals than did workers in the participative group suggests that, in the NARF organizational setting, participation did not lead to setting more difficult goals. As such, the potential positive effects of participation on performance improvement were not realized. Those studies that have reported participative goal setting to be more effective have all found that goal difficulty was higher in the participative than the assigned condition (Dossett et al., 1979; Latham et al., 1978; Latham & Yukl, 1976).

Organizational standards probably played a major role in the goals that emerged from the participative goal-setting sessions. Where workers had some influence in their choice of a goal, they tended to set a goal equal to the existing organizational standard. In retrospect, this is not surprising. Locke (1978) has argued that a standard is an implicit or, sometimes, explicit goal. Likewise, in establishing standards, the organization is specifying both the amount and type of work to be accomplished and the time allocated for it (Greiner et al., 1981). In a sense, the organization has stated a goal for acceptable performance while a goal-setting program is attempting to establish new conflicting goals. Workers receive mixed messages as to what is required and, given a choice, choose the more conservative and historically accepted goal of standard performance.

Goal Acceptance

It was proposed that workers who set goals participatively would show greater goal acceptance than would workers who were assigned goals. The data relevant to this hypothesis are presented in Table 6. The overall mean level of goal acceptance, as perceived by the foremen, was a high 2.63 based on a 3-point scale (1 = no, 2 = somewhat, and 3 = yes). The foremen thus perceived that a large number of their workers accepted the performance goals.

Table 6
Relationship Between Goal Acceptance and Performance
Change for Workers in the Experimental Groups

Experimental Group	Mean Goal Acceptance ^a	Mean Performance Change	Correlation r	N
Assigned	2.66	9.6	.00	53
Participative	2.60	8.4	-.19	53
Total	2.63	8.9	-.07	106

^aBased on perception of the foremen.

No significant relationships were found between level of goal acceptance and degree of performance change for either the total group or for workers within each of the two experimental groups. In addition, no significant difference was found between the level of goal acceptance in the assigned group ($\bar{x} = 2.66$) and the participative group ($\bar{x} = 2.60$). To further explore the relationship between goal acceptance and performance change, level of goal acceptance was used to categorize workers to determine whether the relationship between goal difficulty and performance change would vary at different levels of goal acceptance. According to Locke (1968), goal difficulty and performance change should be related only if goals are accepted.

In order to explore this research question, workers were divided into two groups. The first group ($N = 64$), high goal acceptors, consisted of all workers reported by the foremen to have accepted the goals; all these workers had goal acceptance scale scores of 3.0. The second group ($N = 42$), labeled low goal acceptors, were all other workers who were reported by foremen to have less goal acceptance than the first group. Their mean goal acceptance scale score was 2.07. When level of goal difficulty ($\bar{x} = 8.0$ and 7.8) and performance change ($\bar{x} = 8.2$ and 10.7) were contrasted for the high and low goal acceptors, no significant differences emerged between the groups. Also, the relationship between goal difficulty and performance change was almost identical for each group (high goal acceptors, $r = .35$, $p < .01$; low goal acceptors, $r = .39$, $p < .01$). In summary, goal acceptance, as perceived by the foremen, did not predict performance change nor did it affect the relationship between goal difficulty and performance change. Also, there was no difference in level of goal acceptance as a function of whether goals were assigned or participatively set.

High Versus Low Performers

It was hypothesized that low performers would have more difficult goals (relative to their baseline performance) and show greater performance improvement than would high performers. For the purposes of this study, low performers were defined as those workers who were, on the average, performing below standard (performance score less than 100) prior to the goal-setting program. High performers were defined as workers whose average performance during the baseline period was at or above standard.

Performance Change

Summary data comparing performance changes for high and low performers are shown in Table 7. Two sets of analyses were undertaken. First, the high and low performers in the experimental groups were compared with each other. The low performers showed a mean improvement of 12.8; and the high performers, only 4.3. A repeated measures ANOVA was used to test the significance of this difference. A significant interaction ($p < .05$) was found between low versus high performance and baseline versus test periods; follow-up tests using change scores (see Huck & McLean, 1975) indicated that the low performers in the goal-setting program improved significantly more between the baseline and the test periods than did the high performers ($p < .01$).

Table 7
Mean Performance Efficiency Scores
for High and Low Performers

Group	Baseline Period	Test Period	Performance Change ^a	Adjusted Test Period	N
<u>High Performers</u>					
Experimental	114.0	118.3	+4.3	117.1 ^b	57
Comparison	111.2	111.1	- .1	112.5 ^b	52
<u>Low Performers</u>					
Experimental	83.5	96.3	+12.8	98.3 ^c	67
Comparison	90.1	95.4	+ 5.3	93.5 ^c	65

^aThe difference between the test period and baseline period performance scores.

^bCovariance $F = 2.8$.

^cCovariance $F = 6.3$, $p < .05$.

One problem with directly comparing low and high performers in the same analysis is the confounding effect of regression toward the mean (see Cook & Campbell, 1976). Low performers, independent of any treatment effects, might be expected to improve while high performers would be expected to show decreases in efficiency. Both groups would thus be expected to regress toward the total group mean. For this reason, the second set of analyses was undertaken. Analysis of covariance (ANCOVA) was used to compare the baseline to test period improvements of high and low performers in the experimental groups with high and low performers in the comparison groups. The results from these analyses are also presented in Table 7. The findings indicated that low performers in the experimental groups improved significantly ($F = 6.3$, $p < .05$) relative to low performers in the comparison group. However, high performers in the experimental group did not improve significantly ($F = 2.8$) when compared with high performers in the comparison group.

Analyses were also undertaken to see whether assigned and participative goal setting had different effects for high and low performers. Results indicated that the manner in which goals were set did not affect the degree of improvement for either the low or high performers.

Goal Difficulty

One factor that could explain the different effects of goal setting on low and high performers is goal difficulty. It was proposed that low performers would set (or be assigned) more difficult goals relative to their baseline performance level than would high performers. The results relevant to this hypothesis are given in Table 8. The mean goal difficulty level for all the low performers (15.8) was significantly greater ($p < .001$) than the mean level of goal difficulty for high performers (-.4). On the average, high performers had goals that were slightly lower than their baseline performance level, whereas low performers had average goals that were approximately 16 points above their baseline performance level.

Table 8
Mean Goal Difficulty, Goal Acceptance, and Performance
Change for Experimental High and Low Performers

Experimental Group	Mean Goal Difficulty	Mean Performance Change	Mean Goal Acceptance	N
<u>High Performers</u>				
Assigned	5.0	+5.7	2.79	27
Participative	-5.3	+3.1	2.60	30
Total	- .4	+4.3	2.70	57
<u>Low Performers</u>				
Assigned	16.7	+13.0	2.53	30
Participative	15.0	+12.6	2.59	37
Total	15.8	+12.8	2.56	67

Analyses were also undertaken to compare goal difficulty for assigned and participative workers. Results indicated that mean goal difficulty was significantly higher ($t = 2.54$, $p < .05$) for high performers who were assigned goals (5.0) than for high performers who participatively set goals. Indeed, high performers who participatively set goals had an average goal that was more than five points below their baseline performance. No significant difference was found between the mean goal difficulty level of poor performers in the assigned (16.7) and participative (15.0) conditions.

Goal Acceptance

Although no hypotheses related to this question had been generated, it was of interest to determine whether goal acceptance varied as a function of baseline performance and type of goal setting. Mean goal acceptance scores, based on the foremen's perceptions, are also presented in Table 8. An ANOVA was used to contrast level of goal acceptance across the four groups (i.e., assigned and participative high and low performers). Results indicated that there was no significant difference in level of goal acceptance between any of the four groups. These findings, taken with those reported earlier for the different treatment groups, suggest that goal acceptance was not a significant moderator or predictor of performance change.

Possible Reasons for Differences Between High and Low Performers

Overall, the differential impact of goal setting on high and low performers is consistent with the findings of Pritchard et al. (1981). These researchers argued that high performers may already be motivated and that motivational programs such as goal setting will have little impact on them.

While the above explanation may be relevant to the current results, at least two other possible explanations seem germane. First, high performers were already meeting or exceeding the historical organizational goal of 100. Hence, it may have been unrealistic to expect them to set even higher goals. Second, there may have been a "ceiling" effect. That is, it may have been more difficult for high performers to increase their performance than low performers.

Both of these explanations are consistent with the notions of equity theory (Adams, 1963; Homans, 1961; Carrell, 1978), which states that workers expect a fair return for what they contribute to their jobs. Workers determine what is a fair work input/reward ratio by comparing themselves with co-workers. While this is a somewhat simplified explanation of equity theory, it does provide a framework for interpreting the current results. Although high performers at NARF were doing the same kind of work and receiving the same pay as were low performers, they were obviously providing more work output to the organization. Hence, even before the goal-setting program, there was some degree of inequity for them. However, as a result of the goal-setting intervention, supervisors expected workers to set more difficult goals and generate even greater work output without any additional compensation. If high performers complied, inequity would be further increased. While this explanation is speculative, it seems consistent with the expected extrinsic orientation of industrial blue collar workers (see Harris & Locke, 1974; Hulin, 1971).

Job Satisfaction

In order to assess changes in job satisfaction, the MSQ was administered to both the experimental and comparison groups during the baseline period and at the end of the test period.

As mentioned earlier, the requirement for complete baseline and test period data resulted in a large proportion of missing MSQ data for both the experimental and comparison groups. Approximately 75 percent of the workers had missing data.

In order to assess the representativeness of the remaining 25 percent sample with complete MSQ data, these workers were compared statistically with workers with missing MSQ data on all of the demographic variables, baseline efficiency, and degree of performance change.

Overall, these comparisons suggested that the sample with complete MSQ data was representative of the larger sample used in the study. However, the results must still be interpreted with caution due to the small sample size.

Job satisfaction data for the experimental and comparison workers are presented in Table 9. ANCOVAs were run contrasting experimental and comparison workers on intrinsic, extrinsic, and overall job satisfaction. Although there were slight decreases on all three measures from the baseline to the test period for experimental workers, none of these changes approached statistical significance.

Table 9
Mean Job Satisfaction Scores for Experimental and Comparison
Groups During the Baseline and Test Periods

Job Satisfaction Measure	Baseline Period	Test Period	Adjusted Test Period	N
Intrinsic				
Goal-setting group	4.09	3.94	3.88 ^a	37
Comparison group	3.88	3.95	4.04 ^a	29
Extrinsic				
Goal-setting group	3.21	3.15	3.08 ^b	40
Comparison group	2.85	2.98	3.08 ^b	31
Overall				
Goal-setting group	3.76	3.63	3.58 ^c	32
Comparison group	3.59	3.60	3.67 ^c	25

Note. The response scale for job satisfaction ranged from 1 (very dissatisfied) to 5 (very satisfied).

^aCovariance F = 1.49.

^bCovariance F = .01.

^cCovariance F = .47.

Overall, these results suggested that the goal-setting intervention had no negative or positive effect on the job satisfaction of workers in the experimental group. Since there was a limited sample of workers for whom complete job satisfaction data were available, the results must be interpreted with caution. Nonetheless, the failure to find significant changes in intrinsic job satisfaction is not surprising. A number of studies have shown that extrinsic job factors (e.g., pay, benefits) are more salient to blue collar workers than are intrinsic job factors (e.g., autonomy, recognition) (Fein, 1976; Harris & Locke, 1974; Hulin, 1971). Thus, even if goal setting may have made work more intrinsically motivating, such job changes may not have been important for the workers in the study. Also, since goal setting resulted in few if any changes in extrinsic job aspects, worker extrinsic job satisfaction was not affected.

Perceived Effectiveness of Goal Setting Program

One final data set was used to evaluate the effectiveness of the goal-setting intervention. This concerned the perceived value of the program as seen by both the experimental workers and foremen.

Workers

Two questions about the value of the goal-setting program were asked during interviews conducted with workers at the end of the test period. One question asked whether the employees felt that the program had been of any value for them individually. The other asked whether the employees felt the program had any value for the worker's shop. A summary of the responses to both questions is given in Table 10.

Table 10
Perceived Value of the Goal-setting and Feedback
Program as Seen by the Workers (N=101)

	Yes (%)	Mixed (%)	No (%)	Don't Know (%)
1. All in all, do you think the program has been of any value for you personally?	49	7	39	5
2. All in all, do you think this program has been of any value for your shop?	49	14	23	14

As can be seen, 49 percent of the workers felt that the program had been of value both to themselves and to their shop. Given that the program did not result in any extrinsic benefits, it was interesting to find that approximately one-half of the experimental workers found the program to be useful.

Foremen

Short questionnaires were administered to the experimental shop foremen at the end of the test period in order to get their subjective impressions of the impact of the goal-setting program in their shops. The results from these questionnaires are presented in Table 11. In general, foremen saw the most value for the program in terms of giving them more knowledge about their shop and about employee performance. In addition, about half of the foremen felt that supervisor/subordinate relations had been positively affected. The smallest degree of positive effect was seen in worker effort and efficiency where only 20 to 30 percent of the foremen saw improvements. Overall, these results suggest that, in general, foremen perceived some positive results in their shop as a result of the goal-setting program.

Table 11
Perceived Effect of the Goal-setting and Feedback Program
as Seen by Experimental Shop Foremen (N=10)

Effect On:	Negative or Very Negative	No Effect Or Mixed Effect	Positive	Very Positive
Employee efficiency	0	7	1	2
How hard employees worked	0	8	1	1
Amount of work completed	0	8	1	1
Foreman's relations with employees	0	5	4	1
Shop morale	1	4	4	1
Foreman's knowledge of employee's performance	0	4	3	3
Foremen's knowledge of what goes on in his shop	0	4	4	2

Program Implementation Issues

During the experimental goal-setting and feedback program, the researchers had to resolve a number of important implementation issues. These are discussed in Appendix B. Previous goal-setting research and related literature did not provide clear guidelines on how to best deal with these problem issues. Their resolution was critical since not adequately resolving them could have caused the goal-setting program to fail. The fact that so many basic implementation problems had to be dealt with suggests that goal setting in industrial organizations may often be far from what Latham and Locke (1979, p. 80) have described as "a simple, straightforward... technique for motivating employee performance." Nonetheless, goal setting remains a motivation technique that may provide a high rate of return for a limited time and resource investment by the organization (Perry & Porter, 1982).

CONCLUSIONS

1. Goal setting and feedback can be used to improve worker efficiency in Navy industrial organizations.
2. The amount of performance improvement is related to the difficulty of the established goals.
3. Goal setting and feedback for Navy industrial workers does not appear to affect job satisfaction.
4. The method of setting goals was not a predictor of performance improvement in this research. Both assigned and participative goal setting yield positive results.

5. The existence of established performance standards appears to prevent both foremen and workers from setting challenging performance goals. Instead, they tend to choose the established organizational performance standard.

6. In the NARF organizational context, goal setting is more effective with low performers than with high performers.

7. The implementation of a goal-setting program in a Navy industrial organization is not a simple and straightforward process. A number of difficult decisions must be made on how best to implement the program.

RECOMMENDATIONS

1. Navy industrial commands should consider using goal setting and feedback as a motivational technique to improve worker performance.

2. NARFs should consider using the newly developed performance measurement system for assessing individual worker performance. This system could provide worker efficiency data for use in the command's basic performance appraisal program.

3. Navy industrial commands should explore new ways of ensuring that workers do not view engineered time standards as upper limits on their performance efficiency. Managers need to stress that such standards are for planning and measurement purposes and do not represent organization goals for good performance. One possible approach might be to remove standard times from the work description documents available to employees.

4. More research is needed to better understand (a) the process of implementing effective goal-setting programs, (b) the limitations of using goal setting with high performing employees, and (c) the effects of long-term goal-setting programs.

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APPENDIX A
ALTERNATIVE EXPLANATIONS FOR THE EXPERIMENTAL
WORKERS' PERFORMANCE IMPROVEMENTS

ALTERNATIVE EXPLANATIONS FOR THE EXPERIMENTAL WORKERS' PERFORMANCE IMPROVEMENTS

It could be argued that the performance improvements made by the experimental workers might have been caused by manipulation of the measurement system rather than by working toward new goals. Such manipulation could occur if workers could obtain more earned standard time than was actually warranted by the work they completed. The most likely ways in which this could be done are through use of (1) handwritten shop orders, (2) added lines, or (3) indirect charges to delay. The performance data were examined to determine whether any of these methods was abused to obtain unwarranted earned standard time.

Handwritten Shop Orders (HWSOs)

When a work unit arrives in a shop without its accompanying preprinted documents, a HWSO is prepared and used to account for the time spent on that unit. The HWSO adds an element of flexibility to the work measurement system by allowing needed, but unanticipated, tasks to be performed. It is possible, however, that the HWSO could be used to gain unearned, extra standard time by inflating the standard time for the added tasks or by including tasks on the form that did not need to be performed. This unearned time would artificially increase the performance efficiency score of the worker.

To examine whether HWSO manipulation could have affected the overall increase in the experimental group's performance efficiency, the standard time earned and time expended on HWSOs were aggregated separately for experimental and comparison groups for both the baseline and test periods. These data are presented in Table A-1. As can be seen in the table, the increase in efficiency on HWSOs from baseline to treatment periods is approximately the same for both the experimental and comparison groups. If HWSO manipulations of efficiency were a real problem in interpreting the results, then one should see a much larger increase in efficiency from baseline to test period in the experimental group as compared to the comparison group. Relatively equal increases in efficiency for both groups argue against a greater manipulation of efficiency by the experimental group.

Table A-1

Mean Performance Efficiencies of Experimental and Comparison Workers on Hand Written Shop Orders (HWSOs)

Group	Baseline Period	Test Period	Change	N
Experimental	97.3	107.4	+10.1	124
Comparison	97.8	109.3	+11.5	117

Note. HWSOs comprised approximately 8 percent of the work reported by experimental workers and 19 percent of the work reported by comparison workers.

Added Lines

Added lines serve a function similar to the HWSO. By using added lines, a few tasks can be added directly to the computer-printed shop order rather than initiating an entirely new shop order with a HWSO. This is the easiest way to add new tasks to those already indicated by the shop order. However, due to space limitations on the shop order, only a few lines can be added; a HWSO must be initiated if more lines are required. As with the HWSO, the object of the added line is to provide a degree of flexibility to the work measurement system.

One can also argue that the added line could be as easily misused as the HWSO to artificially inflate the amount of standard time earned by a worker, and thus increase his/her performance efficiency. The expended and earned hours for added lines accounted for an extremely small percentage (less than 5% for any group and time period) of the total expended and earned time during the baseline and post period. Thus, even if added lines were manipulated, they could have only a very small impact on the final efficiency scores. However, there is no evidence that such a manipulation occurred. The results indicated that workers expended more time than they earned on added lines. For both experimental and comparison groups, during both baseline and treatment periods, the average performance efficiency scores on added lines never exceeded 81. It is thus unlikely that added lines had any real impact on the overall treatment effectiveness.

Delay Codes

In the past, when confronted with parts delay or lack of work, workers at NARF would usually not transact a work delay (i.e., a particular kind of indirect labor charge). Instead, they would remain on direct time. At the beginning of the baseline period, NAVPERSRANDCEN researchers, with the aid and approval of NARF managers, attempted to modify this informal procedure by requiring more accurate accounting for delay time.

If properly used, transaction of delay time should provide a more accurate performance efficiency score for the artisan. However, delay transactions could also be used to inflate a performance efficiency score if a worker were to continue to do productive work while on delay time. Since only the workers in the experimental shops were requested to use the new indirect codes, this could result in higher performance efficiencies for experimental workers than for comparison workers. An examination of the total hours transacted by experimental workers against indirect delay codes showed that so few of these transactions were ever made (fewer than 1% of the total hours transacted were made against delay) that either improper or proper use of delay codes would not have significantly affected the study results.

APPENDIX B
IMPLEMENTATION ISSUES

IMPLEMENTATION ISSUES

During the current study, a number of implementation problem areas were identified. Previous goal-setting research and literature did not provide clear guidelines on how the problems should be resolved. Hence, these issues are presented as potential problems that managers must concern themselves with when implementing goal-setting programs. They also represent areas in which future research should be undertaken.

Goal-setting Training

The methods sections of a large number of field goal-setting studies were reviewed in detail prior to implementing the goal-setting program at NARF. This review suggested three conclusions. First, the goal-setting literature is unclear as to who should receive training. In all cases, immediate supervisors who were to use goal setting were trained. However, in some cases, workers were also trained while other studies argued for the need to train middle managers also. Second, the content and process of goal-setting training varied considerably across different studies. For example, the training used in a study by Kim and Hamner (1976) emphasized the setting and measuring of performance goals, whereas Quick (1979) seemed to place heavy emphasis on integrating goal setting with leadership principles. Likewise, some studies used group discussions and role playing while other efforts used a more formal lecture method with films. Finally, both the total length and number of training sessions varied across studies. In sum, it is difficult to determine what actually constitutes effective goal-setting training, even though such training represents an important part of the implementation process.

Goal Difficulty

One of the basic propositions of goal-setting theory is that goal difficulty is linearly related to task performance (Locke, 1968). However, when a supervisor assigns a goal to a subordinate, how does the supervisor avoid the problem of assigning a goal that is either too difficult or too easy and therefore either not accepted by the worker or not motivating for the worker? Locke (1981) suggested that, when participation wasn't used to get input from the worker, the supervisor could base goals on time and motion studies (i.e., standards) or on historical performance. However, the current study has shown that standards can be problematic when high performers are involved. Also, historical performance is sometimes a poor indicator of employee potential and, therefore, may not suggest what would be a challenging goal. In summary, while the concept of a challenging or difficult goal sounds simple, determining such a goal for different workers may not be easy for the supervisor.

Goal Specificity

Goal-setting theory stresses the importance of goals being specific or measurable. While stating goals in terms of units produced or efficiency scores may provide some goal specificity, a second dimension concerns the time frame during which this performance will be achieved. For example, should a goal state that the worker will produce at a certain level for a certain time period (e.g., 100% efficiency for the next 6 months) or specify reaching a certain level on a given date (e.g., 100% efficiency by 10 June 1981)? Clearly, the second goal is more specific while the first goal seems more realistic. The supervisor is more often concerned with consistent performance across time rather than performance on a given day. Thus, the most specific goal may not be the most reasonable goal. While the issue may appear somewhat mundane, it is still problematic for managers implementing goal-setting programs. It also provides the stage for the next problem.

Ratcheting of Goals

Once a worker achieves a goal, that goal may no longer be challenging. Hence, the supervisor should now assign or participatively set a new goal. For example, in a study by Latham and Yukl (1976), typists received weekly feedback on their progress toward goal accomplishment. If they achieved their goal, a new and more difficult goal was assigned or set participatively. In a sense, an interesting dilemma was created for the worker. The more you do, the more is expected. This problem is similar to the issue of ratcheting found with incentive systems (see Fein, 1976). If workers perform above a standard and earn incentives, the standard is raised, making it more difficult to earn incentive money in the future. Ratcheting problems have caused the demise of many incentive systems (Patten, 1977). Surprisingly, this problem has not been adequately addressed in the goal-setting literature.

Feedback

Research has shown that performance feedback is a necessary condition for goals to affect performance (Erez, 1977; Shaw, Locke, Bobko, & Beitzell, 1981). Nonetheless, very little is known concerning the best way to provide feedback. It can vary in specificity, amount, type, source, timing, frequency, and whether it is positive (e.g., "You're almost there") or negative ("It doesn't look like you'll make it") (Ilgen, Fisher, & Taylor, 1979). There has been considerable variability in the quality and quantity of feedback provided to workers in goal-setting studies. Given the criticality of feedback in the goal-setting process, it is surprising that this variable has not been more systematically investigated. Managers and researchers must now make some rather arbitrary decision on how and when to provide feedback to workers. Given the resource costs required to provide high quality and timely feedback (e.g., weekly performance feedback meetings), organizations may be likely to provide less than adequate feedback to goal-setting employees.

No Negative Consequences

A basic condition that has been stressed in most goal-setting studies is that workers should not be disciplined or criticized for failing to attain their goals (e.g., see Latham & Locke, 1979; Latham & Yukl, 1975, 1976). This value orientation is presented in order to reduce resistance to the program and hopefully increase goal acceptance. While this orientation may appear reasonable from the researcher's point of view in that it should increase motivation, it can create problems for the organization when dealing with poor performers. For example, suppose goals are set for workers on critical performance dimensions. However, a number of poor performers lower their performance during the test period. If goal-setting tenets are followed, the supervisor would, instead of criticizing these employees, set new, less difficult goals.

The above scenario is not unrealistic and, in fact, occurred in the present study. Managers lived up to their policy of "no negative consequences" and did not discipline the individuals. However, in this case, the goal-setting program created conflicts with other existing organizational policies for dealing with poor performers.

Worker Equity

It was mentioned earlier that high performers may perceive inequities if they are assigned or asked to set goals above their current performance level. Most goal-setting studies (and the current one) stress that setting and accepting performance goals is voluntary. However, Locke (1978), among others, has noted that the demand conditions in most organizations are similar to those found in the research laboratory. That is, workers

perceive that they have little real choice in refusing to have goals. In the current study, there was no conflict for poor performers. Being asked to improve their performance seemed like a reasonable request. Both foremen and workers, however, sometimes questioned the "reasonableness" of setting goals for high performers. These workers were already meeting or exceeding organizational expectations. One high performing worker asked a researcher why he should set a goal higher than the individual working next to him, given that both workers had similar training and were receiving the same amount of monthly pay. This was not an easy question to answer. In a sense, NARF managers were attempting to establish two different psychological contracts with workers who were receiving the same pay and benefits (see Schein, 1970). This issue may be more problematic with blue collar workers and nonmanagerial workers since these individuals are more likely to have an extrinsic orientation towards work than are white collar and managerial employees (Fein, 1976).

In summary, a number of implementation issues have been presented that could affect the success of goal-setting programs. The extent to which each of these issues is critical will probably depend on the organizational context in which the goal-setting program is implemented. Nonetheless, these problem areas suggest that goal setting may often be far from a simple and straightforward process.

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