

## LOW TECH, LOW COST APPROACH TO OFFICE ERGONOMICS

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A field study was conducted to determine the effectiveness of introducing various low tech, low cost solutions into an office environment. Formal ergonomics training provided employees and management with an awareness of ergonomic principles and cumulative trauma disorders. As a result of employee interviews and observations, individual employees were provided with ergonomic interventions to improve their work environment. These interventions involved low cost equipment modifications or purchase of accessories. In the time period following the training and interventions, various benefits were realized. Body part discomfort ratings decreased by an average of greater than 50 percent. Money paid out for workers' compensation experienced a reduction of over 60 percent and the total number of lost days was 25 percent less. The average monthly production rates in the customer service department increased by over 5 percent. Complaints issued against the customer service representatives have decreased as well.

### INTRODUCTION

Jobs in the offices of United Parcel Service are changing dramatically as business needs are changing. Enhanced service offerings for customers required more active use of the computer and greater information processing. In response to these changes, as well as awareness of ergonomics and pending regulation in the state of California, the North California District of United Parcel Service took a proactive approach to low tech, low cost ergonomics in their offices. The District formed an Ergonomics Committee to develop their approach to communicate ergonomic principles to their employees, as well as to evaluate the existing work environment and make necessary improvements. This committee coordinated their efforts with the Corporate Ergonomics Committee that was beginning to address office ergonomics throughout the organization.

Office training was developed and presented to all employees and management personnel. Employee interviews and observations alerted management to the areas in need of improvement. Changes were made and various methods of data collection were utilized to measure the results.

### METHOD

The method by which the Ergonomics Committee introduced the rest of the District to ergonomics included group and individual training, interviews and observations, determination of necessary interventions, and implementation of the interventions. Throughout the process, several indices including body part discomfort ratings, workers' compensation, production, and complaints were tracked to measure what effect, if any, the ergonomic principles training and office enhancements have made on the performance and well being of the employees. Since this was a field study, the significance of any changes is not easily measurable.

### Training

A comprehensive office training program was developed to convey an understanding of ergonomic principles, provide information for recognition of the types and causes of cumulative trauma disorders, and to promote personal wellness at work and at home. Training was presented to all management and non-management office employees in the North California District. The management were trained first and received 1-1/2 hours of comprehensive training. The non-management employees received 1-1/4 hours of interactive training. The concept of micro-stretches, simple stretches that can be performed while in the work area, was introduced and several sample stretches were practiced. Specifics about workplace improvement were discussed. Management employees were also taught how to conduct a Safe Work Methods Evaluation as an annual follow-up.

Photographs were taken of employees demonstrating good work practices. The photographs were made into posters outlining ergonomic reminders and were posted throughout the office. Seeing photographs of their peers sit a certain way or perform a micro-stretch encouraged greater acceptance and participation by the employees.

### Interventions

Following the training, the District Ergonomics Committee evaluated the need for ergonomic enhancements to the office. Working with a limited budget, the group concluded that the purchase of fully adjustable chairs for all non-management employees would be a priority. Most of the chairs in the office were becoming worn and difficult to adjust, if adjustable at all. Chairs were chosen that would allow the employees to work with their existing desks and accommodate a variety of postures and body sizes. Employees were provided with training on the function and adjustment capabilities of the new chairs.

Employees were interviewed and observed to determine their specific needs for accessories. Footrests, monitor arms, document holders, wrist rests, glare screens, and headsets were provided to satisfy individual needs. In some cases, desks were physically altered to provide additional leg clearance or lift the work surface to a more comfortable height. Lap drawers were removed and stable supports were used to elevate desk legs. Keyboard drawers were installed under desks to allow employees to more comfortably reach the keyboard. Desks were relocated to position the computer screens to avoid glare. All computer equipment was positioned to allow for a neutral body position.

All employees were given an opportunity to voice their opinions about the training and interventions in a questionnaire. This provided the Ergonomics Committee with the information necessary to improve upon their practices.

The cost of the interventions ranged from approximately \$300 per employee for just the chair, to a maximum of approximately \$600 per employee for the chair and all of the necessary accessories and modifications. This cost is low in comparison with the potential savings that could be provided.

### Body Part Discomfort Ratings

Ten, randomly chosen employees were surveyed to determine their discomfort in various body parts. A survey asked the employees to rate their level of work-related discomfort in each body part. Comments as to why they felt that they experienced the pain or discomfort were also solicited. This provided the Ergonomics Committee with further insight on the necessary improvements.

A year after the first training and interventions, the same ten employees were surveyed for their body part discomfort ratings. The results of the two surveys were compared by totaling the before and after ratings and calculating the percent change for each body part. A paired t-test with alpha of +/- 0.05 was used to determine any significance.

### Workers' Compensation

Injury and illness data were collected monthly one year before and one year after the interventions. Monthly averages were compiled for all injury/illness occurrences, lost time injury/illness occurrences, lost time days, and total medical and indemnity costs. The percent change of the average monthly figures for before and after the training and interventions was calculated.

### Production

The level of production would not be expected to change as a result of ergonomics training and interventions; however, it was tracked for the customer service function. The average number of calls handled per hour was tracked on a monthly basis. The percent change of the average number of calls handled before and after the training and interventions was calculated. Emphasis should not be placed on

this measure because many other factors influence production including scheduling, staffing, service changes, and computer system or phone upgrades.

### Complaints

The issuance of complaints against customer service representatives was tracked. This may be an indicator of morale in the office in that a low number of complaints may indicate a degree of job satisfaction among the employees. The average number of complaints filed against customer service representatives was calculated for the year following the initial training. Data from the year prior to the training were not available. Since the majority of the interventions and follow up training took place during the year following the training, trends can be viewed to note any recent changes.

### RESULTS

Since this was a field study, determining the significance of most of the changes was not possible. The Hawthorne Effect as well as system and personnel changes make it difficult to track any potential benefits. It should be emphasized that these results are from a small study with little control over extraneous factors.

### Body Part Discomfort Ratings

According to surveys from ten randomly selected employees, body part discomfort ratings have decreased by an average of 57.8% over all body parts. A decrease of at least 20% was evident in each body part with more than half decreasing by 50% or greater. Table 1 shows the difference in the discomfort ratings by body part for before and after the initial training.

Table 1. Body part discomfort ratings before and after ergonomics program.

Body Part	Before	After	% Change
Eyes	10.0	5.0	-50.0%
Neck	10.5	6.5	-38.1%
Shoulders	14.5	11.0	-24.1%
Upper Back	5.5	2.5	-54.5%
Upper Arms	8.0	4.0	-50.0%
Middle Back	10.0	5.5	-45.0%
Lower Back	15.5	7.5	-51.6%
Lower Arm	11.0	8.0	-27.3%
Buttocks	6.0	0.0	-100.0%
Wrists	14.5	11.5	-20.7%
Hands	13.0	9.0	-30.8%
Thighs	2.5	0.0	-100.0%
Knees	6.0	0.0	-100.0%
Legs	6.0	1.5	-75.0%
Feet	5.5	0.0	-100.0%
<b>AVERAGE</b>			<b>-57.8%</b>

A paired t-test indicated that significant decreases in body part discomfort ratings were evident in several body parts. Table 2 outlines the body parts with significant changes from the surveys taken prior to the training and interventions to the surveys taken after the training and interventions. Because of the small sample size, it is important not to draw major conclusions based on the results of this test.

Table 2. Body parts with significant changes following ergonomics training and interventions.

Body Part	Change
Eyes	Decrease
Lower Back	Decrease
Hands	Decrease
Knees	Decrease
Buttocks	Decrease
Legs	Decrease
Feet	Decrease

### Workers' Compensation

The occurrence of all injuries and illnesses increased an average of more than 60 percent after the training and interventions. It is believed that this may be due to an increase in awareness, thus an increase in reporting. The occurrence of lost time injuries remained constant. Robert Getty from Lockheed (Lindsay, 1994) pointed out as many other companies do also, that an increase in lost time injuries was experienced after beginning an ergonomics intervention program. This dilemma was believed to be a result of employees coming to understand the true nature of their aches and pains. In most cases; however, the injury severity and cost are not as great.

This was the case in the North California District. Although the number of lost time injuries did not change, the lost days decreased by more than 25 percent. The medical and indemnity costs associated with all injuries and illnesses both decreased substantially. Table 3 shows the specific workers' compensation changes from the year before the initial training to the year following the initial training and interventions.

Table 3. Workers' compensation changes following ergonomics training and interventions.

Index	% Change (Average)
Total Injuries / Illnesses	64.2%
Lost Time Injuries / Illnesses	0.0%
Lost Time Days	-25.2%
Medical Cost	-57.2%
Indemnity Cost	-67.5%
Total Cost	-62.6%

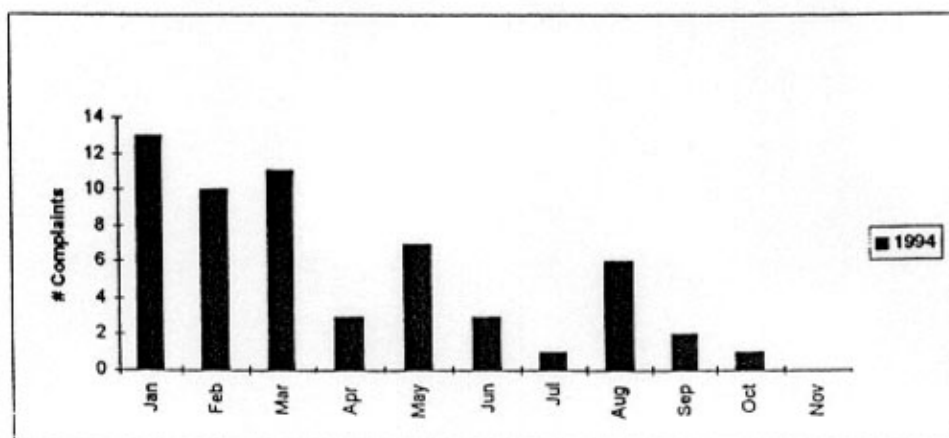
### Production

Production in the customer service function was not expected to increase due to the recent increased focus on service quality. The number of calls handled per hour is no longer a valued performance measure. However, production did increase by over 5 percent in the year following the initial training.

### Complaints

The number of complaints reported against customer service representatives has decreased in recent months. Table 4 shows the number of complaints received during the year following the initial training. The ergonomic interventions were still being received through May. After this time, everyone had received group and individual training and was provided with any necessary ergonomic interventions. From viewing the trends from January to May and then from June to November, there has been a reduction in the number of complaints filed. This may be the result of better customer service, improved quality, and greater worker morale and job satisfaction.

Table 4. Complaints issued against customer service representatives.



## CONCLUSION

Overall, the impact of this low tech, low cost approach to office ergonomics has been successful. Simple, inexpensive solutions were implemented to improve the comfort of the employees. Any doubt and uncertainty at the onset of the program have been relieved. Employees understand how using ergonomic principles and working smart can help them in the long run. According to the questionnaires distributed following the training and interventions, the employees were appreciative of the time and effort spent to make them feel better at work. There were some areas of concern, but there will always be a need for continuous evaluation and improvement.

As new employees and management venture into the North California District offices, the Ergonomics Committee realizes the need to continue to provide training and determine specific needs for individuals. Ergonomics will become a part of the day to day activities in this district with periodic workplace audits and annual certification.

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