Journal of Organizational Behavior Management

ISSN: 0160-8061 (Print) 1540-8604 (Online) Journal homepage: http://www.tandfonline.com/loi/worg20

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Brandon L Hall & Daniel E Hursch

To cite this article: Brandon L Hall & Daniel E Hursch (1982) An Evaluation of the Effects of a Time Management Training Program on Work Efficiency, Journal of Organizational Behavior Management, 3:4, 73-96, DOI: 10.1300/J075v03n04_08

To link to this article: http://dx.doi.org/10.1300/J075v03n04_08

AN EVALUATION OF THE EFFECTS OF A TIME MANAGEMENT TRAINING PROGRAM ON WORK EFFICIENCY

Brandon L. Hall
Daniel E. Hursch

ABSTRACT. This study was designed to investigate whether the amount of time spent on high-priority tasks could be increased through the use of a training manual and weekly meetings with a time management consultant, and to see what effect changes in high-priority time would have on self-rated scores of work effectiveness and satisfaction. The four participants in the study were members of the faculty and staff at West Virginia University and were selected on the basis of having difficulty in accomplishing high-priority work due to procrastination, interruptions, or poor planning. The major effect following Intervention was an increase in high-priority time. The Pre-Intervention and Post-Intervention change in average time spent each day on high-priority tasks for each individual was: 28 minutes, increased to 2 hours and 19 minutes; 6 minutes, increased to 2 hours and 38 minutes; 17 minutes, increased to 2 hours and 24 minutes; and 28 minutes, increased to 1 hour and 32 minutes. The weekly self-evaluations of effectiveness and satisfaction followed roughly the same pattern as the changes in high-priority time. The Intervention was administered using a multiple-baseline across individuals design. The effect occurred at a different time for each participant, and only after the introduction of the treatment. One can conclude from these findings that the time management training program was effective in increasing time spent on high-priority tasks, and, as a result of this increase, self-ratings of productivity and satisfaction also increased.

The results of poor time management are evident everywhere: staff members are late to meetings and unprepared, appointments are overlooked, car repairs are not completed on time, work style is

This manuscript is a version of a dissertation completed by the first author under the supervision of the second author. At the time of the study, the first author was supported by a West Virginia University Graduate School Fellowship.

Reprints can be obtained from the first author at: Wilson Learning Corporation, 6950 Washington Avenue South, Eden Prairie, MN 55344.

Journal of Organizational Behavior Management, Vol. 3(4), 1981/1982

hectic and disorganized, etc. On a personal level, there can be many unfortunate consequences. Interpersonal relations deteriorate, professional competence is called into question, career and personal goals are unfulfilled, and individuals experience a hurried and harried work life. On a societal level there are great, but incalculable, costs. Organizations are less effective, projects are not completed on time, human resources are wasted, and people are therefore, perhaps, not as happy as possible.

Effective time management consists of using procedures which are designed to help the individual to achieve his or her desired goals. However, it is difficult to specify the exact behaviors which the effective time user emits. These depend on the goals of the person and the constraints of the work setting. In most general terms, however, effective time management means the right task is performed at the right time, work progresses at an organized and comfortable pace, there is plenty of time for leisure, and most importantly, the nonverbal behavior of the individual matches their verbal behavior, i.e., actual work matches the plans and desires of the person.

An index of popular periodicals (Limerick, 1972-1976) lists 24 articles on time management over a recent five-year period, and Third (1972-1976) cites 41 articles in the business literature over the same period. In addition, there have been at least five books published (Lakein, 1973; MacKenzie, 1972; MacKenzie, 1975; Engstrom and MacKenzie, 1967; Weber, 1972) and at least two management consultants work full time in this area (these two consultants have written four of the five books on time management, as well as many of the articles).

How to Get Control of Your Time and Your Life by Alan Lakein (1973) is the best seller among books in this area. It is designed for the general population and includes examples from a variety of situations (including housework). It offers specific strategies rather than simply admonitions to do better. The first of these is to make lifetime goal statements. The second contribution is Lakein's Priority System for categorizing goals and tasks according to importance and urgency. There are explanations of other strategies in the book, including:

—planning and scheduling of work time;
—task analysis of goals (identification of ways to achieve goals);

—use of a "to-do" list (a daily list of things to be done that day, with the most important activities to be completed first);
—ways to avoid procrastination (break the job into smaller components, work just five minutes more on the job, verbalize the negative consequences of procrastinating further and the positive consequences of completing the job, identify the situation that produces procrastination and change it); and
—setting aside some "quiet time" each day for undisturbed work on high-priority activity.

There are also a variety of strategies to reduce the time spent on the telephone, in meetings, on paperwork, and on reading.

The preceding materials offer a wide variety of stretegies designed to improve the management of one's own time use. The area of behavior analysis also offers strategies designed to control behavior (Miller, 1975; Malott, 1974; Ulrich, Stachnik, and Mabry, 1975). Although not designed specifically for time-use modification, many of the strategies would be most applicable. Basic procedures include specification of behavior (planning), observation (measurement of time use), and consequation (feedback and reinforcement).

Although the time management literature contains a number of suggestions concerning how one might use their time more effectively, there is a glaring lack of data to support any of the recommendations. Not only are there no data-based evaluations of time management training, there are not even any uncontrolled case studies describing changes following time-use training. For a study investigating the effectiveness of time management strategies, there is no existing literature to indicate what measurement procedures to use, or which dependent variables to measure.

One reason for the lack of data-based studies is the difficulty of obtaining accurate, reliable, and non-reactive measures of time use. *The International Encyclopedia of the Social Sciences* (1968) identifies three ways researchers have measured individual's time use. These are "yesterday interviews," self-recorded time logs, and direct observation. Each has its advantages and disadvantages.

Yesterday interviews have commonly been used by sociologists, economists, and anthropologists. The researcher conducts a detailed interview with the respondents concerning how the previous day was spent. In this manner, a large number of individuals can be questioned at a minimal cost. Although this procedure could provide

reasonably accurate data when large number of subjects are used, it does not provide sufficiently accurate data on individuals to evaluate an intervention study.

Self-recording of activities in a daily log or diary has also been used to ascertain time use. The literature contains many examples of attempts to document study habits and modify duration of study which have relied exclusively on self-reported data. The independent variables in these investigations have included contracts (Chaplin and Karoly, 1975) and announced tests (Class, 1935). Applied behavioral research, however, requires independent measures of the behavior in order to assure reliability of the data (Baer, Wold and Risley, 1968). Attempts to provide reliability measures of self-recorded study behavior have proven difficult. Procedures that have been used include: direct and infrequent observation in a special setting (Bristol and Slone, 1974); having the study behavior of interest occur in a special setting where it can be directly observed (Brodon, Hall, and Mitts, 1971 and Sowers, Lloyd and Lloyd, 1977); and studies assessing the connection between self-reported study behavior and measures of quiz performance and length of materials to be studied (Johnston, O'Neill, Walters, and Rasheld, 1975; O'Neill, Walters, Resheld, and Johnston, 1975; and Walters, O'Neill, Rasheld, and Johnston, 1975). The results of the studies have been mixed with strong conversations reported (Johnston et al., 1975; O'Neill et al., 1975; and Walters et al., 1975), minimally acceptable reliability in a controlled setting (Bristol and Slone, 1974), and little correspondence between self-reported study and actual study time spent (Broden et al., 1971 and Sowers et al., 1977).

The need for reliability measures, therefore, stems from the questionable accuracy of self-recording. With behaviors other than studying, some researchers report high reliability of self-recording (e.g., Azrin and Powell, 1969, for pill taking and Ober, 1968, for smoking). On the other hand, Fixsen, Phillips, and Wolf (1972) found self-recording and even peer reporting of room cleaning to be inconsistent with observations by a trained observer. In another study, parents trained in self-recording of attending to appropriate behavior were found to record inaccurate data when compared with independent observations (Herbert and Baer, 1972). Clearly, independent observations are needed to evaluate the reliability of self-recorded data.

Another serious problem often results when self-recording is used, and that is reactivity. Reactivity refers to change in the mea-

sured behavior which results simply as a function of the measurement process. When self-recording is used as an independent variable, it is this very process which is desired. However, when self-monitoring is used as a measurement tool, it is important to consider whether reactivity may effect the results. The phenomenon of reactivity of self-recording is not well understood, and it has not consistently occurred in similar studies. In some early clinical case studies, positive results were found when clients were urged to record their own problem behavior (e.g., Rutner and Bugle, 1969, for auditory hallucinations and Thomas, Abrams, and Johnston, 1971, for tics, although this was confounded with the effects of praise). Other studies have attempted to isolate the effect of self-monitoring in controlled studies. This often proves difficult since it is necessary to obtain an unobtrusive, external obsrvation of the rate of behavior before self-recording begins. The alternative is to use control groups with different independent variables. However, that tactic does not provide for a comparison of pre-self-recording rates. Gottman and McFall (1972) examined the effects of self-monitoring on class participation in a high school class. The students were trained in either self-recording of class participation, or self-recording of the desire (but failure) to participate. Control was demonstrated by later reversing the procedure for the two groups. The authors found that self-monitoring increased the amount of participation when participation was recorded, but no increase in participation was found when only the urge to participate was recorded. Other studies have reported positive results from self-monitoring with such behaviors as studying (Johnson and White, 1971), disruptive behavior (Broden et al., 1971), and appropriate parental interaction (Herbert and Baer, 1972).

The third method of obtaining data on an individual's time use is through direct observation. This generally consists of one or more individuals being trained by the investigator in the defining and recording of the subject's behavior. The trained observers then either continuously observe the subjects or do so on a time sampling basis. Direct observation can be less reactive than self-recording since the subject does not see the data, nor is the subject required to make a recording response after each target response. The primary disadvantage of direct observation is that it requires a great deal of time on the part of the observers. If the observations are made in the natural setting, the time required is even greater, and the intrusiveness can make the study impractical. This problem can be reduced

by observing the subjects in a special setting (e.g., Bushell, Wrobel, and Michaelis, 1968; Hall, Lund, and Jackson, 1968; Mawhinney, Bostow, Laws, Blumenfeld, and Hopkins, 1971; and Sowers et al., 1977).

Of the three measurement strategies discussed above, two are applicable to the present study: self-recording and direct observation. As indicated in the literature, the major drawbacks of self-recording are low reliability and reactivity of the procedure, whereas direct observation is limited by the intrusiveness of the procedure and by the large amounts of time and labor required.

One way to reduce these problems would be to combine the measurement strategies. By having the subjects do most of the recording, the problems of intrusiveness and time expenditure often plaguing direct observation would be reduced. In addition, reliability of the self-recording could be monitored and improved through the use of frequent reliability observations. Such a measurement procedure could then be used to evaluate a time management training program.

Although many books and articles are available which provide advice on how to use one's time in a more productive fashion, the literature contains no data-based studies of whether time management strategies do, in fact, result in improvements. An empirical investigation is needed to study what changes, if any, occur when time management strategies are taught. The current study is designed to investigate whether work efficiency, defined as the proportion of high-priority work compared to total work, can be improved through the use of a set of instructional materials, feedback, and weekly meetings with a consultant. In addition, each participant's satisfaction with their productivity was measured through the use of a weekly self-evaluation to determine whether this also changed as a function of the intervention.

Method

Participants

Four members of the faculty and staff at West Virginia University served as participants in the present study. They were selected from volunteers who responded to a notice placed in mailboxes in several departments on campus. The notice described several common time management problems, and stated that a free program was to start which could help remediate these problems.

The following criteria were used in the selection of participants: (1) that each be on campus full time throughout the summer; and (2) that each was troubled by not being able to complete enough high-priority work, due to either procrastination, interruptions, or poor planning.

Each participant used in the study is described below and is referred to throughout the study by an occupation. To insure anonymity, the occupation of each participant has been changed to a similar, but different, area.

Nurse. This participant directed a special multi-disciplinary program for students. The job involved working with students from a variety of programs, and placing them in several community practicum sites. Much of the work day was taken up by meetings with students and directors of programs, and by visiting community settings. Her work area was somewhat disorganized, with files and papers stacked on the desk, and memos tacked to the wall. The initial interview indicated that there were sometimes one or two trips out of the building during the day, and that there was a lack of systematic planning on a daily or weekly basis. The data may be affected by the fact that she was pregnant during the study and wanted to complete current projects before the delivery. The study was completed five weeks before the expected delivery, with data collection taking place over the previous two months.

Chemist. This person was a full-time research associate who had no responsibilities other than self-directed research. He had his own lab with a corner containing a desk, which served as his office. He had an organized work area and worked a full day at the lab. He expressed a desire to spend more time on planning new research projects, reading the current literature, and writing articles about completed research.

Physicist. This individual also worked full time on research, directing several research projects staffed by graduate students. He had a very organized work area with only current materials on his desk at any time. He complained of having no time for his own activities because of constant interruptions by his students when they developed problems in the lab. He wanted to spend more time reading professional journals, working on his own projects in the lab, and writing articles.

Forester. The Forester was in charge of a large research project which involved many of the faculty in his department. He had a very disorganized work area, and a disheveled personal appearance. He

expressed no clear long-term goals, but was concerned with completing several ongoing projects. He complained of being frequently interrupted, spending too much time socializing during the day, and of leaving the building once or twice a day on personal business. His primary concern was reducing procrastination and spending more time on his projects.

Setting

For each participant, observations took place in their regular work area.

Nurse. All observations took place in her office, which was connected to a waiting room and secretarial area. Although part of her work took place outside of the building, only time in the office was recorded by the participant and monitored by the reliability observer. Time spent working outside of the office was recorded in a log by the participant and was used as supplemental, anecdotal data.

Chemist. All recording for the Chemist took place in his lab. In one corner of the lab, secluded by a bookcase, was his desk which contained the recording device.

Physicist. The recording for the Physicist took place in his office which was located off a main corridor.

Forester. All recordings for this participant took place in his office which was located off a large reception and secretarial area.

Data Recording Apparatus

Data were recorded by the participants using clocks and a log. Ordinary electric alarm clocks were used to record Regular-Priority Time, High-Priority Time, and Meeting Time. The three clocks were plugged into a power control box (Radio Shack, #270001) which had three switches and three indicator lights, one for each of the clocks. The control box was placed within easy reach of the participant on their desk. During baseline the face of each clock was masked and the clocks were placed out of sight behind each desk. After intervention, the masks were removed and the clocks were placed in full view on top of the desk. The plastic knobs used to change the position of the clock hands were removed for the duration of the study to insure that the time setting was not adjusted.

Building Time and any outside work was recorded by participants in a log. This was simply a note pad which was kept on or near the

desk. In this log, each person recorded the time they entered and left the building, as well as any work that was completed outside of the office.

Dependent Measures

Building Time. Upon arrival each day, each participant recorded the time they entered the building. When they left the building, either for the day or for only a short period, the person recorded the time leaving the building. This time reflected the total time in the building, whether in the office or not, and whether on task or not.

Regular-Priority Time. Whenever the participant was working on any professional regular-priority work (excluding the other categories), this clock was turned on. Work in this category included work related to classes, community service, and research. It did not include any personal business, reading newspapers or novels, writing personal letters, or personal phone calls. This measure was added to time in meetings and time on high-priority tasks to provide a measure of Total Work Time.

Meeting Time. Meeting Time was defined as any time another person was in the office discussing professional matters. It included scheduled meetings, brief interruptions, and telephone calls. If a meeting concerned a high-priority project, it was recorded as a meeting, not as High-Priority Time. Two of the participants had very few meetings, so the measure was used only for the Physicist and the Nurse.

High-Priority Time. Prior to Baseline, each participant specified several projects and activities that were of particular significance to their long-term professional goals. The guidelines for specifying tasks for this category included that they be tasks that have long-term payoff, are very important to one's career, and the type of task that one may have difficulty completing because of procrastination or poor planning.

Reliability of the Dependent Measures

The reliability of each participant's self-recording was checked by the investigator an average of 1.4 times per day. The procedure involved the investigator entering the office and observing the status of the lights and the behavior of the participant with respect to the recording categories. The log was also checked to insure that the

individual had recorded the time they had entered the building. Because of the way each office was situated, the observer was able to enter the office and observe the status of the lights before being seen by the participant. The exception to this was the Chemist's lab, but here the participant was either working in the lab away from the recording apparatus, or working at the desk and could not see the observer enter until he was close enough to see that the switches for the clocks were not changed.

A total of 231 reliability observations were made. Of these, the participants were in their office, and an agreement or disagreement was recorded 191 times. An agreement was counted if the appropriate clock was switched on (identified by the labeled indicator light) for the work category the participant was engaged in. This usually involved the observer asking the participant what they were working on, if it wasn't readily identifiable. If the Building Time log was not current, or if there was any error with the clocks, a disagreement was recorded.

Reliability levels were determined by dividing the number of agreements by the number of agreements plus disagreements. The overall reliability level for all participants was 95.6%. The lowest reliability level occurred with the Forester who averaged 89.6%, and whose reliability ranged from a low of 77.7% the first week to a high of 100% for the 4th and 5th weeks. No disagreements occurred with the Physicist, and only one for the Chemist (average 98.6%). One disagreement was noted for the Nurse on each of four different weeks, for an average of 94.1% agreement.

Procedure

Baseline Procedure

1. Initial consultation—Once an individual had been selected to participate in the study, the investigator met with the person and discussed the problems that the participant had with time management, and the goals that he or she hoped to reach through the study. These included such things as reduction of low-priority task time in the office, increase in high-priority task time (e.g., writing articles or chapters, revising a course for the next semester, writing a grant application, etc.), in-

crease of professional reading, or a decrease in meetings and interruptions. The investigator avoided making any suggestions or recommendations at this time and simply let the participant briefly discuss their goals.

2. Specification of high-priority tasks—Each participant listed several tasks that were very important, but not necessarily urgent (i.e., no strong contingencies). These were activities which could be worked on throughout the study, although some might be completed before the end. It was stressed that designated high-priority tasks were to be worked on only in the office, whenever possible. These included the following:
   - Physicist: writing research reports and reading the current literature. One of the research reports was needed for a conference the first week of August.
   - Chemist: planning new research, reading the current literature, writing research reports.
   - Forester: writing a large research report due in October, writing a report for a private company, writing a grant proposal.
   - Nurse: planning a conference for the end of September, clearing and organizing desk and files, developing plan and report for a grant, organizing two large strategy meetings, hiring a new staff member, developing a work plan for an applied setting.
3. Data recording—Each participant self-recorded Building Time in a log and recorded Regular-Priority Time in the office, Meeting Time, and High-Priority Time by turning on hidden clocks.
4. Log of outside work—Participants kept a log of all work completed outside the office and thus not recorded as described above. The members of the study were asked not to change the amount of work conducted outside the office during the course of the study.
5. Data from the clocks was recorded at the end of each day by the participant's secretary or by the investigator. Data slips from the secretaries and daily sheets from the log were collected daily by the investigator.
6. Weekly self-evaluation—Each participant completed a self-evaluation each week. The evaluation called for a ranking from 0–100 on the participant's subjective view of the week in

terms of their overall effectiveness and overall satisfaction with their effectiveness.

7. Weekly meetings—The investigator and the participant met once a week to discuss any problems that were occurring with the data collection. This served as a control for the social contact which was part of the weekly problem solving sessions after intervention. Detailed notes were kept of the meetings by the investigator, and an audio tape recording was made during each phase.

Intervention Procedure

1. Each participant read the time management manual and completed the exercises in it. The exercises included specifying goals, breaking goals down into smaller tasks, and scheduling them across a three-month period (a copy of the manual is available from the Senior Author upon request and at cost).
2. The investigator and participant discussed the completed exercises and how the materials would be applicable to the participant.
3. Weekly and daily schedules were made by each participant and monitored by the investigator on a regular basis.
4. A copy of their graph was given to each participant. They were asked to record the data from the clocks and log each day, and to record this on the graph. The investigator kept duplicate records.
5. Weekly meetings between investigator and participant, involving
   —review of data from previous work
   —social reinforcement from investigator for appropriate data collection and improvements in time use
   —identification and discussion of problem areas. This usually centered on increasing high-priority task time.

Design

A multiple-baseline design across individuals was used. Baseline measures on each participant were taken until stability of the dependent measures was achieved. The procedure was then initiated for the first participant, the Physicist. Once a change had been ob-

served, the Chemist was exposed to the procedure, followed by the Forester, and finally the Nurse.

Results

Figure 1 shows the main effect of the study, that of an increase in the time spent on high-priority tasks. The amount of time spent each day on high-priority tasks for each participant during Baseline and after Intervention is plotted. The Physicist's daily average during Baseline was 28 minutes spent on high-priority tasks. This increased to an average of 2 hours, 19 minutes following Intervention. The Physicist showed a decrease over the two weeks of Baseline on this measure. After Intervention, the weekly average of 2 hours, 31 minutes dropped by 47 minutes, then rose to 2 hours, 41 minutes. The amount of high-priority time increased across days within weeks following Intervention. This participant went to a professional conference and then vacation following Week 5.

The Chemist's Baseline average was 6 minutes per day, which increased to 2 hours, 38 minutes after Intervention. The Chemist's weekly averages during Baseline were 13, 0, and 04 minutes. After Intervention, these increased to 1 hour, 48 minutes; 4 hours, 52 minutes; 1 hour, 19 minutes; 1 hour, 02 minutes; and 1 hour, 06 minutes. There was also an increase in variability in high-priority time following Intervention. The data for the first two weeks following Intervention decreased across days within weeks, the third week's data showed a large increase on Thursday, the fourth week's data increased around a level trend, and the last week's data showed an increase across days.

The Forester increased the amount of high-priority work from a Baseline daily average of 17 minutes to an average of 2 hours and 24 minutes after Intervention. During Baseline the Forester's weekly means were 0; (vacation during Week 2); 55 minutes; and 13 minutes. Following Intervention these increased to 2 hours, 03 minutes; 1 hour, 59 minutes; and 3 hours, 10 minutes. There was an increase across days within weeks and across weeks from the first two post-intervention weeks and some variability around a level trend for the last week of data. The Forester went on vacation following Week 7.

The Nurse's Baseline average was 28 minutes; her Post-Intervention average was 1 hour and 32 minutes. The Nurse's weekly aver-

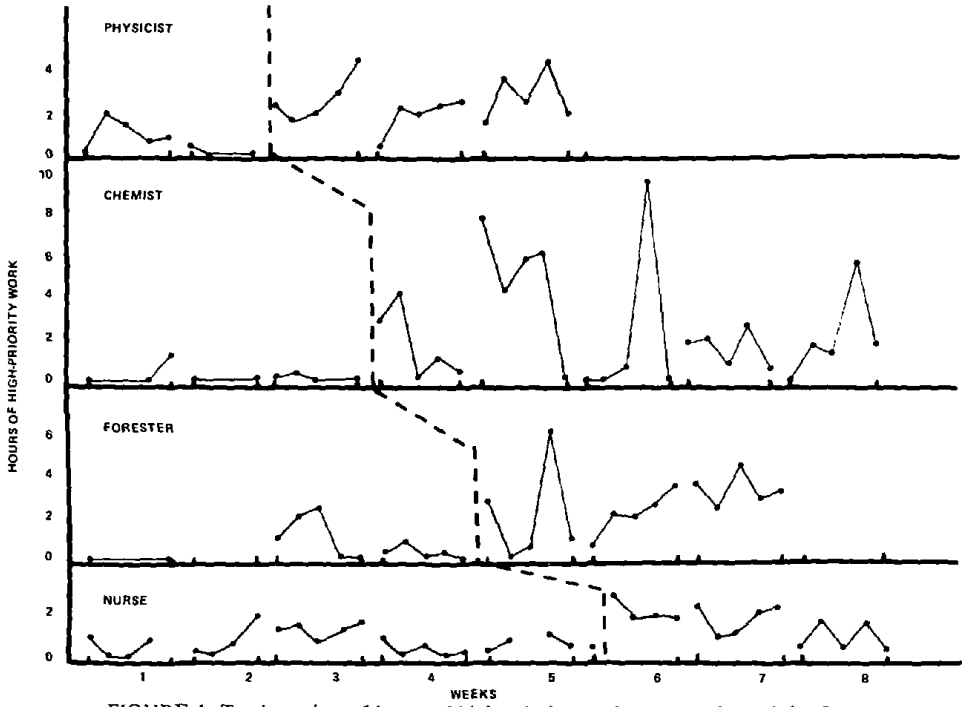

FIGURE 1. Total number of hours of high-priority work spent each week by four participants over an eight-week period.

ages during Baseline were 15, 34, 59, 14, and 19 minutes. Following Intervention, the weekly means were 2 hours, 11 minutes; 1 hour, 40 minutes; and 40 minutes. The data across days within the first week following Intervention decreased, within the second week the data decreased from Monday to Tuesday and increased from Tuesday through Friday, and the last week's data showed around a lower level trend.

No other consistent effects on the time measures were found in the study. No directional changes occurred for Building Time, Total Work Time, or Meeting Time.

Every Friday each participant completed a questionnaire asking two questions:

1. How effective or ineffective do you feel you were this week? (0 = very effective, 100 = very ineffective)
2. How pleased or displeased are you with your effectiveness this week? (0 = very displeased, 100 = very pleased)

Each participant's self-rating scores of effectiveness and satisfaction are shown in Figure 2. There was some increase for both measures for every participant except one (the Physicist).

The pattern of the self-rating scores followed roughly the pattern of the change in High-Priority Time for each participant. Notable exceptions include: Weeks 2 & 4 for the Physicist, when High-Priority Time decreased, but self-ratings did not; week 3 for the Chemist, when the effectiveness self-rating increased, but High-Priority Time remained at zero, and Week 3 for the Nurse, when both self-rating scores decreased, but High-Priority Time was the highest of any week during Baseline.

The Physicist's self-rating of effectiveness increased following Intervention, but self-rating of satisfaction did not change at all.

The Chemist's self-rating of effectiveness also increased following Intervention, but this continued a trend started during the last two weeks of Baseline. The self-rating score of satisfaction increased an average of over 15 points following Intervention.

Changes in self-rating scores increased the greatest in the case of the Forester. The effectiveness rating increased an average of over 25 points after Intervention, and the score on satisfaction increased an average of over 40 points.

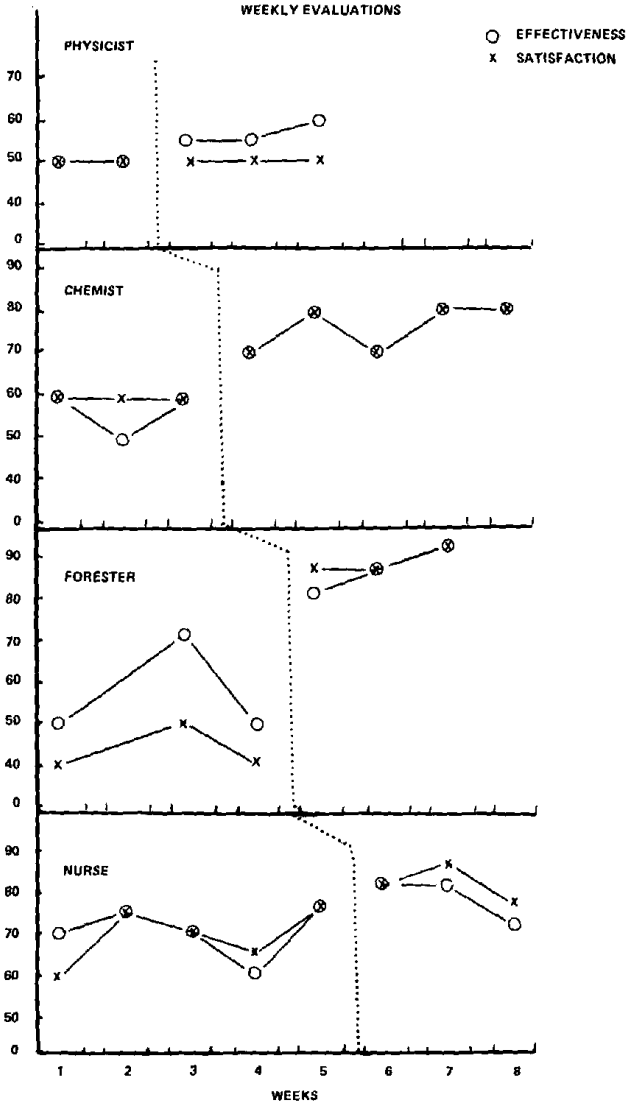

FIGURE 2. On a weekly questionnaire designed to assess participants' ratings of their effectiveness and satisfaction with their time use (0 = low effectiveness/low satisfaction; 100 = high effectiveness/high satisfaction).

The Nurse's self-rating of effectiveness increased slightly during the first two weeks after Intervention, but then returned to the Baseline level for the third week. The self-rating scores of satisfaction also showed a slight increase after Intervention, then returned to Baseline level.

A further indication of consumer satisfaction, as well as each participant's explanation of changes in the data, is presented in responses to a questionnaire which was completed by each participant in the study on the final day of data collection. Since it is difficult to make generalizations about this information, it will be covered in the Discussion chapter.

Discussion

The present study was designed to investigate whether the amount of time spent on high-priority tasks could be increased through the use of a training manual and weekly meetings with a consultant, and to determine whether increases in high-priority time would increase self-rated scores of effectiveness and satisfaction.

It was found that the time spent on high-priority tasks was greater for every individual following the Intervention than it was during the Baseline phase. The fact that this increase occurred at a different time for each participant, and only after the introduction of the treatment, suggests that uncontrolled variables were not responsible for the increase. One can therefore conclude that the treatment components produced the increase in time spent on high-priority tasks.

The main effect of the study was the increase in high-priority task time after Intervention for each individual, and the concomitant increase in self-evaluation scores.

For each of these individuals there were already strong contingencies to complete high-priority tasks. But because there were (usually) no immediate deadlines, days slipped by without progress being made on these areas. The intervention components were evidently sufficient in each case to prompt the participant to work on these areas.

In addition to the stated intervention variables, at least one other variable may have been operating. Individuals may have been influenced by the desire to please the investigator, even though the investigator stressed to the participants the importance of not letting

other matters influence them. There is no indication that this happened, but it is mentioned here as simply the most feasible non-treatment explanation. Only further research which withholds meetings with the participants will be able to answer this question fully.

In the following paragraphs, each participant's work style will be discussed, along with what was believed to be the critical treatment components for that person.

The Physicist was a very effective professional, but he was bothered by constant interruptions. The primary component for him, and identified in the project evaluation, was the weekly and daily planning. During the first consultation, that which followed completion of the manual, the investigator and the participant identified frequent interruptions as the primary time management problem and developed a unique schedule for the participant. The Physicist posted a schedule on his door which specified his activities each day, and his accessibility for each hour. For example, 8-10 a.m. was high-priority time, and 5-second interruptions were allowable. Ten a.m. to noon was "Quick Problems" time, and 5-minute interruptions were allowed. One p.m. to 3 p.m. was set aside for scheduled meetings (on demand basis), and 3 p.m. to 5 p.m. was for completing the day's tasks and interruptions were not allowed. Although the Physicist had to be somewhat accessible at almost all times because of the ongoing research, this schedule allowed him to limit interruptions and have time for high-priority, as well as other, work. One of the high-priority tasks that the Physicist was working on was due for a conference in early August. This no doubt added to the incentive to increase time on high-priority tasks. However, the participant stated in the project questionnaire, that, without the training package, this would not have been started as early, or done as effectively.

The Chemist was also an effective professional, working on research every day in his lab. Although he had no trouble conducting the experiments, he did complain, and the data support the notion, that he had trouble writing articles about his research, reading the current literature, and planning new research. There were no deadlines for these activities, and they suffered as a result of poor planning and procrastination. On the project questionnaire, he stated that all of the components were "very useful" with the exception of the clocks and the graphed data (they were rated "useful"). From talking with the participant and from other responses on the ques-

tionnaire, it appeared that weekly and daily planning, the focus on high-priority tasks, and the weekly meetings were responsible for the increase in high-priority time. Because of the necessity of completing certain phases of experiments at one time, there is no even, consistent work on high-priority tasks. The investigator stressed the importance of establishing a regular high-priority work time, but it was evidently not feasible for this participant's work situation. Nevertheless, the increase in the amount of high-priority time following Intervention was substantial.

The Forester had several reports to complete, and there was a deadline for one of them (initially August 15, this was changed in early August to October 15). In spite of the deadline, little work was accomplished during the Baseline phase. As the participant stated in the project questionnaire, "External deadline of August (October) 15 helped motivate report writing effort a great deal, but participation in (the) program enabled me to do the work." The Forester's main problems were procrastination and lack of planning. During the first week of Intervention, work on high-priority activities showed great variability and there were several low days. On Monday afternoon of the second week, the Forester set a minimum criterion for himself of two hours per day on high-priority work. This criterion was met and then exceeded every successive day. The goal specification components, the task analysis, and the meetings with the investigator were cited by the Forester as "very useful." All other components were rated lower. Perhaps more than anything else, the program provided a focus for what to work on, with monitoring by the investigator providing a mild and frequent consequence.

The Nurse's data are complicated by the fact that she was pregnant and wanted to complete certain tasks before leaving for the delivery in late September. In addition, one week after the initiation of the Intervention, she decided to resign from her job (to be effective one month after the study was completed) because a new supervisor was to be hired in her office. This altered the priority ranking of some of her high-priority tasks (25% as indicated in the project questionnaire). She continued to work on the remaining high-priority tasks that she had not yet completed (50% were completed by the end of the study). In the questionnaire, she listed specifications, task analysis, and scheduling of summer goals, along with meetings with the investigator as "very useful." The priority system was indicated

by her as the most useful of any of the components. The Nurse and the Forester were similar in not having clear goals, not engaging in sufficient planning, and procrastination. Both cited the planning components as very useful.

If the time management training package was truly effective and useful, then changes should occur in other aspects of the participant's life. It is difficult to assess such changes, and the primary indication of this occurring in the present study is each member's response to the questionnaire.

The Physicist indicated that changes in other aspects of his life did not occur. He did respond, however, affirmatively to the question concerning whether he spent more time working on and thinking about personal goals because of the Intervention.

The Chemist showed the greatest generalization to other aspects of his life. Immediately following Intervention, he began swimming, and he missed only two days during the entire Intervention phase. He did not swim at all during the Baseline phase, and swimming was never mentioned until it appeared on the participant's weekly planning form. He indicated that he also took less work home after Intervention, and that he wanted to use long-term planning for family activities, exercise, and financial goals.

The Forester stated that although he took less work home, he was able to accomplish more work in the evenings. Two weeks after Intervention, the Forester showed the investigator a list of personal goals he had compiled on his own, and expressed a desire to begin work on these areas of his life, too.

The Nurse indicated on the questionnaire that less work was taken home each evening, and that time at home was used more effectively. This participant showed the investigator how she used the goal setting, task analysis, and scheduling procedures to plan personal goals, including arrangements for the expected baby.

Each participant volunteered for the present study because they were not accomplishing as much as he or she had hoped to. Each participant had a unique background and set of time management problems, and each used a different mixture of components in the program. In spite of these differences, perhaps some generalizations can be made regarding why the program was effective.

Poor performance can usually be traced to a deficiency in skill or a deficiency in motivation. Although none of the participants lacked long-term motivation (that is, they each had long-term goals), some

of them had problems with procrastination and short-term competing contingencies which resulted in little time being spent on their stated high-priority tasks. Some of the components are believed to have been effective in remediating the motivational problems. By specifying long-term goals, breaking these goals into smaller tasks, and scheduling these tasks on a calendar, it became aversive to miss the self-imposed deadlines. By recording the time spent on high-priority tasks and discussing improvements with the investigator, feedback was available and reinforcement was contingent on improvement.

Skill deficiency in time management was also evidenced by each of the participants, and training in this area added to the effectiveness of the program. Although each participant was an effective professional, each lacked familiarity with procedures which could be used to plan time use, reduce time spent on low-priority activities, and free time for work on high-priority activities. For the Physicist, this consisted of the use of the publicly-displayed work schedule. For the others, it consisted of the same procedures outlined above, as well as the daily and weekly planning forms, and the general time-saving strategies outlined in the manual.

Perhaps the most important single component contributing to improvement, however, was simply keeping each participant involved in the program: the weekly discussions with the investigator kept each participant focusing on increasing high-priority time, and each was allowed to experiment with the different components to see what worked best for them. In this way they came in contact with the reinforcers stemming from successful work, and from engaging in the time management behaviors.

In summary, an effective time management program must have components which will: (1) remediate skill deficiencies; (2) remediate motivational deficiencies; and (3) force continued use of the components by the participants.

Attempts to assess satisfaction are very important since dissatisfaction with work productivity is why people are interested in time management. The weekly self-ratings of effectiveness and satisfaction, like the foregoing participant statements concerning generalization of effects are "simply verbal behavior" which make their validity somewhat suspect. Undesirable variables may be controlling those verbal reports, such as the desire to please the investigator by rating the effects favorably. It is difficult to determine the

extent to which this was the case in the present study, so caution is needed in drawing conclusions based exclusively on these self-reports.

As cited earlier, the weekly evaluations roughly followed the changes in the high-priority time data. It is interesting to note that there were exceptions to this. No explanations are available to account for these deviations in the data other than to repeat that verbal behavior is often unreliable. Other measures of satisfaction are provided in the responses to the project questionnaire. It is heartening to note that all participants indicated they were very satisfied with their improvement in productivity.

From the results of the present study, the following recommendations are made for future research:

1. High-priority work time is probably the best measure to use since it represents a *qualitative* improvement in time use. However, this category should be somewhat flexible if the study is going to include data collection over several weeks in order to allow for legitimate changes in what constitutes high-priority tasks.
2. Some measure of participant satisfaction is very important, and the measures used in the present study may be less than optimal. Methods to provide a valid measure of satisfaction need to be developed.
3. A study which includes a component analysis is needed to identify the critical time management components. The most useful variables are probably goal specification, priority setting, and scheduling. It would also be valuable to conduct a study which did not include meetings with a consultant in order to separate out the effects of this component.
4. Since there are usually existing contingencies in the natural environment for work on high-priority goals (by definition), perhaps almost any procedure will increase high-priority time if it includes at least monitoring and feedback on progress, and some procedure to maintain minimum motivation, e.g., meetings with a consultant.
5. A very useful study could be conducted by using naturalistic observation to identify the relevant time management skills of persons identified as effective time managers.
6. A critical area to be researched in future studies is the devel-

opment of ways to maintain the improvements achieved in a time management training program. This might include use of a buddy system, training in behavioral principles and problem analysis, performance contracting, etc.

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