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A TECHNOLOGY FOR PROGRAM MAINTENANCE: PROGRAMMING KEY RESEARCHER BEHAVIORS IN A STUDENT HOUSING COOPERATIVE

DEBORAH E. ALTUS, THOMAS M. WELSH, AND L. KEITH MILLER
UNIVERSITY OF KANSAS

Behavioral researchers play critical, but often unanalyzed, roles in the programs they develop. Unless they replace their key activities with standardized procedures, their continued participation may be essential to program success—a situation that is often not only impractical but may be prohibitively expensive and disliked by local staff. This study was conducted in a student housing cooperative that is dependent on close researcher supervision for its continued health and survival. A key activity of the co-op researchers was to provide public recognition for good job performance by co-op members. The purposes of this study were (a) to replace that idiosyncratic recognition with systematic procedures so members, instead of the researchers, would provide public recognition to each other for good job performance; and (b) to evaluate those procedures by comparing job performance when member-delivered recognition was provided and when it was not. When the procedures were in place, job performance increased and fines for poor job performance and complaining at meetings decreased. This study suggests that procedures can be developed to reduce program reliance on the researcher that are effective, inexpensive, sustainable, and acceptable to the participants—a first step toward developing a technology of program maintenance.

DESCRIPTORS: maintenance, experimenter behaviors, student housing cooperative

During the 1960s, the Ford Foundation (1972) devoted more than $30 million to support some 25 innovations in public schools. Their own evaluation of their effort produced a conclusion that has been the conventional wisdom ever since: "Thus, the success or failure of a project probably was determined more by the performance and continued service of the project director than by any other single factor" (p. 33).

The idea that the survival and prosperity of an innovation depend on the continued presence of the innovator has been rediscovered many times since (Stolz, 1984). For example, Bassett and Blanchard (1977) found that the staff so mismanaged and altered a prison token economy when the director left that many of the participants dropped out of the program. Couch, Miller, Johnson, and Welsh (1986) described a similar problem in a student housing cooperative where the length of residency of participants was much shorter during periods without researcher supervision. Additionally, Wolf (1982) noted that he and his colleagues "were often able to have some impact on important problem behaviors" but found that "as soon as we would pull back, the use of the procedures would substantially decrease or disappear altogether" (p. 44).

However conventional, the assertion that a program's success depends on the tenure of its originator is not a satisfactory behavior analysis. Indeed, attributing program functions to a person, a set of

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Requests for reprints should be sent to Deborah Altus, Department of Human Development and Family Life, University of Kansas, Lawrence, Kansas 66045.

credentials, a social climate, or historical accident is a rejection of behavior analysis. The observation that a program is diminished by the absence of a key person should, instead, invite the conclusion that the person did something important not done when he or she was absent. This is a conclusion that points to the next task in the analysis: to identify the key performance and institute a procedure that will have the same function when the key person is absent.

The present study took place in a student housing cooperative where the innovators, inspired by *Walden Two* (1948), designed a work-sharing system to promote equitable participation in household chores (see Feallock & Miller, 1976). For several years, the work-sharing system, which was responsible for maintaining a chore completion rate of 95%, was supervised by resident researchers. Because the work-sharing system had no procedures for acknowledging good job performance, it was typical for the resident researchers to tour the house nightly and praise members who were working diligently on household tasks. In addition, the researchers publicly recognized members at weekly house meetings for their contributions to the community.

At the time, the researchers were unaware whether these informal procedures were important to the operation of the work-sharing system. Further, the importance of doing a behavior analysis of the researcher's role in program operation had not been suggested by the literature. When the researchers moved out of the cooperative, fewer members shared in the work, the quality of work diminished, and complaining seemed to increase (see Altus & Welsh, 1990). Looking back, the researchers suspected that routine procedures were needed to replace the function of their idiosyncratic reinforcement procedures.

Consequently, the work-sharing system was changed so that the members, instead of the researchers, would recognize each other for good job performance. The purpose of this study was twofold: first, to demonstrate that job performance would increase and complaining decrease when recognition was given for good work; and second, to demonstrate that the new procedures could be administered successfully by the members themselves.

METHOD

Participants and Setting

Participants were residents of a coeducational student housing cooperative, the objective of which was to provide a long-lasting form of student housing that was democratic, harmonious, and egalitarian. The physical structure consisted of two three-story frame houses joined together by a common lounge. Members were housed in private bedrooms and shared numerous common rooms including a dining room, laundry, TV room, game room, and two kitchens. All participants were at least half-time university students who ranged in grade level from freshman to graduate, and in age from 17 to 50. During the 6 years in which data were collected for this experiment, 219 residents (134 male and 85 female) lived in the house, although a maximum of 30 students could live in the cooperative at any one time. The mean length of stay per member was approximately 1 school year.

Twenty-eight members resided in the house throughout the main experimental conditions of the study (the 1985 fall semester), with 1 member moving in at midsemester. The residents' fields of study were diverse and included physics, sociology, and architecture. Nationality was also diverse, with membership including 62 international students over the 6 years of data collection.

Work-Sharing System

A work-sharing system, developed by Feallock and Miller (1976) and augmented by Welsh, Johnson, Miller, Merrill, and Altus (1989) and Johnson, Welsh, Miller, and Altus (1991), was designed to promote the equitable distribution of household chores and management responsibilities. These jobs—including cleaning the house, cooking meals, paying bills, and maintaining the facilities—were completed by members themselves without the help of paid staff. Each job was defined by a checklist

of tasks. Members earned credits if they adequately completed their jobs and were fined if they did not, based on the number of tasks completed on the job checklists. Members were required to earn 100 credits per week, which represented about 6 hr of work. If members met their credit requirement, they received an $80 reduction in their average monthly rent of $230. Members lost 20¢ of their rent reduction for each credit under the requirement. This was referred to as a deficit credit fine. In addition, members received $2.00 fines for completing less than 70% of a job or for missing a critical component of a job.

To operate the meal and cleaning programs, approximately 72 household jobs were required each week. These jobs included cooking meals, washing dishes, and cleaning all the common areas (e.g., bathrooms, hallways, kitchen, dining room, laundry). In addition, 16 coordinating jobs were performed by the residents (see Johnson et al., 1991). Coordinating jobs included keeping financial records, collecting rent, purchasing supplies, and calculating members' credit balances.

Members received five credits for attending weekly business meetings, during which they signed up for jobs and made all the important decisions regarding governance of the co-op. Each night a member who signed up for the job of inspector completed an inspection of members' work. In addition, another member, called the reliability inspector, conducted spot inspections to audit the inspector's performance. The credit recorder assigned credits and fines to members based on the inspector's records. Inspections were conducted as a regular part of the work-sharing system and were independent of this study's data collection system.

Procedure

A group of awards for good job performance was added to the ongoing operation of the work-sharing system. These awards, known as the Worker-of-the-Week program, included:

Worker of the night. Each night the inspector selected 2 workers for their outstanding performance. The inspector wrote the workers' names on the front of the inspection record, posted nightly in the lounge.

Worker of the week. Each week, 4 coordinators (food, cleaning, repair, and audit coordinators) picked 1 outstanding worker to honor from each of their programs. The coordinators announced the names of the outstanding workers at the weekly meeting and gave rationales for their selections. For example, the food coordinator might say, "I picked John for the worker of the week of the food program because he worked especially hard to cook a delicious dinner for the community last Saturday." To guide them in their sections, coordinators were given a list of behaviors that characterized outstanding workers. This list included behavior such as arriving promptly, working independently, solving problems, and doing extra work. The four coordinators wrote the names of the workers of the week on top of their weekly job sign-up sheets.

No-fine list. At the last meeting of each month, the Worker-of-the-Week manager read a list of the names of members who were not fined during that month and then posted the list in the house lounge.

Lottery. At the last meeting of each month, the Worker-of-the-Week manager held the lottery. Members who had been chosen as workers of the week or who were on the month's no-fine list were included in the lottery. Members could increase their number of lots in the lottery by being chosen as worker of the week more than once, or by being both a worker of the week and on the no-fine list. The lottery winner was chosen during the house meeting by the previous month's winner, who drew a lot out of a box. The winner received $20. The program manager wrote the names of the workers of the week and lottery winners on a large poster, which was prominently displayed in the house lounge.

Written Instructions

Brief written instructions, consisting of a four-page manual, study guide, and checklist, allowed house members to manage the Worker-of-the-Week program themselves. In addition, job checklists of

the meeting chairperson, the 4 coordinators (food, cleaning, repair, and audit), and the inspector were amended to specify their roles in the operation of the Worker-of-the-Week program.

Observation and Measurement: Dependent Variables

Three dependent variables were observed and measured: tasks completed by members on their household jobs; the number of fines accrued by members; and the complaints made by members at house meetings. The first author served as primary observer for all measures.

Household tasks completed. Every household job was specified by a checklist of task outcomes, such as "floor mopped clean" or "trash basket empty and trash liner replaced." Task observations were made four times a week during the 1985 fall semester and twice a week during the 1986 spring semester. Nonroutine housework, such as repairs, was checked weekly during the fall semester. The number and type of assigned tasks varied slightly from day to day, but was roughly the same from week to week (the mean number of tasks observed per day was 174 with a range of 125 to 203). The second author conducted independent observations at least once in each condition. Observation records were compared item by item, and the number of agreements was divided by the number of agreements plus disagreements. Reliability had a mean of 92% with a range of 84% to 97%.

Fines accrued. "Fines accrued" was the number of fines given for poor job performance (jobs less than 70% complete, or noncompletion of tasks specified as critical) or for not meeting the credit requirement. Fines were assigned by the credit recorder based on the nightly inspections made by members. The credit recorder posted a list of fines in the house lounge at the end of each week. Fines accrued was the count of items on this list.

Complaints made. "Complaints" were measured at the weekly meeting during the section set aside for announcements. Each announcement was classified as a positive comment, neutral, or a complaint based on its tone, content, and members' reaction to the comment. (A more complete description of the classification system is available from the authors upon request.) Observation records were compared, item by item, and the number of agreements was divided by the number of agreements plus disagreements. Reliability, taken at least once in each condition, had a mean of 92% with a range of 83% to 100%. Complaints were not recorded until the fourth meeting of the 1985 fall semester.

Observation and Measurement: Independent Variable

Management tasks completed. Twenty-two weekly management tasks and 11 additional monthly tasks were required by the Worker-of-the-Week program. During the 1985 fall semester, while the first author was managing the program, the completion of management tasks was not observed. During the 1986 spring semester, when a house member was the Worker-of-the-Week manager, the first author recorded the occurrence of management tasks on a checklist. The second author conducted independent observations in both conditions. Observation records were compared task by task, and the number of agreements was divided by the number of agreements plus disagreements. The total number of tasks comprising the reliability observations was 55, 49 of which were permanent products (e.g., job sign-up sheets). Reliability was 100%.

Experimental Design

This study alternated periods when the Worker-of-the-Week program was in place and when it was not. After two alternations, the program was implemented by a house member, first without written instructions and then with them. Consequently, this might be described as an A-B-A-B-B′-B″ sequence of experimental conditions.

Baseline. During the baseline condition, which took place during the last 3 weeks of the 1985 spring semester, the work-sharing system operated without the Worker-of-the-Week program. Data from this period were collected from house archives for two of the measures: tasks completed and fines accrued. The observations of tasks completed were

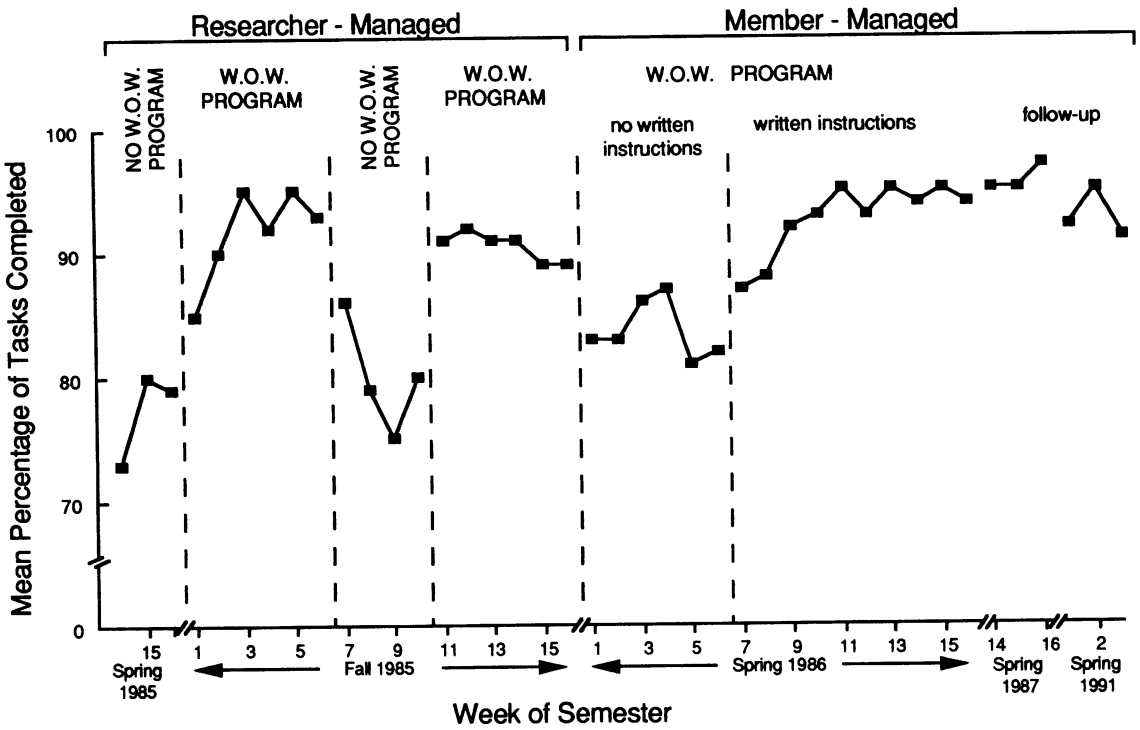

Figure 1. Mean percentage of household tasks completed as a function of the presence and absence of the Worker-of-the-Week program and two different management conditions.

made by a house manager, and there were no reliability checks.

Worker-of-the-Week program. During the first 6 weeks of the 1985 fall semester, the Worker-of-the-Week program was added to the work-sharing program.

No Worker-of-the-Week program. During the next 4 weeks, the program was removed and the work-sharing system operated as before.

Worker-of-the-Week program. During the last 6 weeks of the fall semester, the Worker-of-the-Week program was reintroduced.

Worker-of-the-Week-program without instructions. During the first 6 weeks of the 1986 spring semester, a house member managed the Worker-of-the-Week program but no written instructions were provided.

Worker-of-the-Week program with instructions. Finally, for the last 10 weeks of the spring semester, the same house member managed the Worker-of-the-Week program with written instructions.

Follow-Up

At the end of the 1987 spring semester, 1 year after the experiment ended, 3 weeks of follow-up data were collected on three measures: tasks completed, complaints made, and Worker-of-the-Week tasks completed. This process was repeated during the first 3 weeks of the 1991 spring semester. Follow-up data for the fourth measure, fines accrued, were collected continuously for two semesters after the study ended (fall 1986 and spring 1987) and for the 1990 fall semester.

RESULTS

Household Tasks Completed

The primary effect of the Worker-of-the-Week program is shown in Figure 1. When the program was introduced, the mean percentage of tasks completed rose from a baseline level of 78% to a mean of 91%. When the program was withdrawn, performance dropped to a mean of 80%, then rose again to a mean of 91% when it was reintroduced.

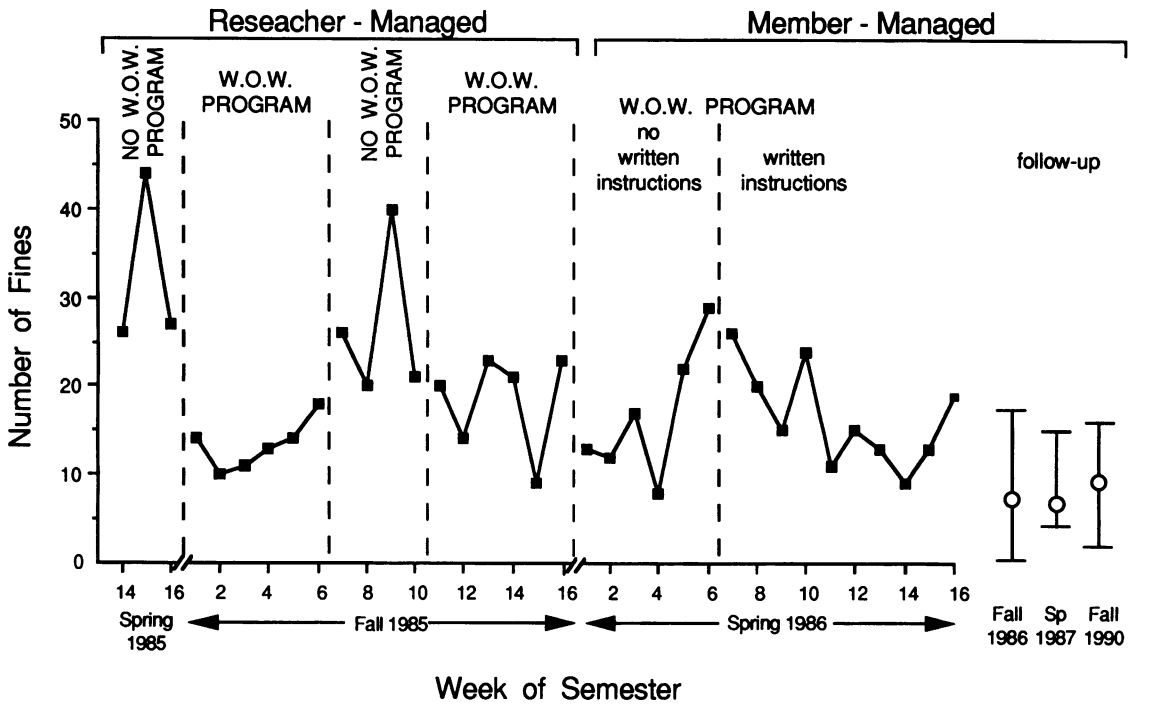

Figure 2. Number of fines accrued by members as a function of the presence and absence of the Worker-of-the-Week program and two different management conditions.

Of the 28 students who were members throughout the fall of 1985, only 2 showed patterns of job performance opposite of the mean group pattern.

When the management of the Worker-of-the-Week program was turned over to a member in the spring of 1986, mean performance dropped to 84%. With the subsequent introduction of written instructions in the 7th week, performance improved to a mean of 94%, with a range of 92% to 95% for the final 8 weeks of the semester. One year later the mean performance stood at 96%. Five years later the mean performance was 92%.

Fines Accrued

Figure 2 shows the effect of the Worker-of-the-Week program on the number of fines accrued by members. Before the Worker-of-the-Week program was introduced, members accrued a mean of 32 fines per week. With the introduction of the Worker-of-the-Week program, the mean dropped to 12, rose to 27 when the program was withdrawn, and dropped to 18 when the program was reintroduced.

When the management of the Worker-of-the-Week program was turned over to members in the spring of 1986, members accrued a mean of 17 fines per week. With the subsequent introduction of written instructions, the mean dropped slightly to 15. During the fall of 1986, members accrued a mean of seven fines per week (ranging from 1 to 17); during the spring of 1987, the weekly mean remained at seven (ranging from 4 to 15); and in the fall of 1990, members accrued a mean of 10 fines per week (ranging from 2 to 16).

Complaints Made

Figure 3 displays the effect of the Worker-of-the-Week program on complaints. Data on complaints were not collected until the 4th week of the second condition of the study. When the Worker-of-the-Week program was first in place, a mean of 25% of all meeting announcements were com-

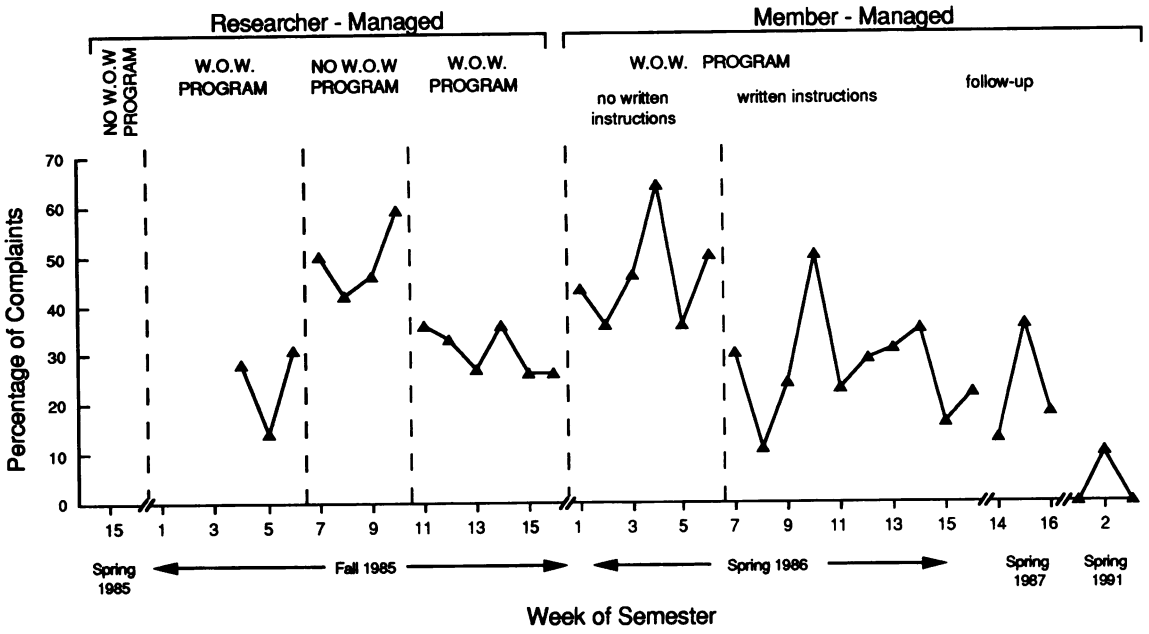

Figure 3. Percentage of announcements that were complaints as a function of the presence and absence of the Worker-of-the-Week program and two different management conditions.

plaints. When the program was withdrawn, a mean of 50% of the announcements were complaints. Complaints fell to a mean of 30% when the program was reinstated.

When management of the Worker-of-the-Week program was turned over to a member in the spring of 1986, a mean of 46% of all announcements were complaints, but this fell to a mean of 26% after written instructions were introduced. During the first follow-up period, complaints remained at 26%; during the second follow-up period, complaints dropped to 3%.

Management Tasks Completed

Before written instructions were given to the member managing the Worker-of-the-Week program in the spring of 1986, the member completed a mean of 53% of the weekly management tasks (ranging from 29% to 65%). After receiving written instructions, the member completed a mean of 92% of the tasks (ranging from 80% to 100%). This mean dropped slightly to 88% during the follow-up periods.

DISCUSSION

After several years of uncertain operation, the addition of simple procedures for recognizing good work brought job performance of the members of a student housing cooperative back to the 95% level originally reported by Feallock and Miller (1976) when the cooperative was managed by resident researchers. In addition, members accrued fewer fines and complained less when the new procedures were in place. The effect of written instructions on managerial performance is less clear, because the design did not provide a replication. Nevertheless, members managed the program very effectively after the introduction of brief written instructions.

In absolute terms, behavior change from one condition to the next may seem small. Each task, however, was defined by members out of their own interests, suggesting that even a small improvement in job performance is important. Indeed, when one or two job tasks are not done, the result can be unpleasant, even unhealthy. For example, if the

kitchen cleaner neglects to empty the trash can (which contains the residue from 30 dinner plates), it attracts bugs and rodents.

The Worker-of-the-Week program received member support, as shown by members' willingness to adopt it as a permanent part of the work-sharing system. This decision was made with the knowledge that they must allocate $20 from their monthly budget to pay the lottery winner, spend meeting time to make presentations, and require additional work of the coordinators. That the program remains in place 5 years after the end of the experiment suggests that the program is a valued part of the work-sharing system.

The primary purpose of the Worker-of-the-Week program was to provide procedures to replace the function of key behaviors of the researchers. Job performance increased and complaining decreased when the Worker-of-the-Week program was added, suggesting this purpose was met. Further, by providing a more complete technology, the survival and replicability of the behavioral program were enhanced. Indeed, it would be difficult, if not impossible, for the "typically well-trained reader" (Baer, Wolf, & Risley, 1968, p. 95) to replicate a program that depended on idiosyncratic behaviors of the innovators.

We do not suggest that all the behaviors of innovators can be replaced by technology. Unpredictable events may arise that need professional attention. If important parts of an innovator's role in a program can be defined and implemented by others, however, the program will be more likely to survive the replacement of that innovator. Furthermore, turning over tasks performed by professionals to local staff can result in substantial savings (e.g., Johnson et al., 1991; Welsh et al., 1989).

This study may also offer a strategy for assessing the social validity of a program that is more objective and reliable than the traditionally used verbal report. We withdrew our close supervision from only one component of our comprehensive behavioral program. In this case, the introduction of maintenance materials ensured the continued implementation of that component. Had the maintenance materials been ineffective, we would have been able to intervene easily because we were still actively consulting in the setting. Probing for procedural fidelity by removing professional supervision of only one aspect of a behavioral program may provide important information about the social validity, and hence survival, of the overall program (see Schwartz & Baer, 1991).

In 1984, Stolz noted that a large number of studies had suggested that program success might be enhanced by employing a key individual who is enthusiastic and committed, but she concluded that this "is not a practical technology" (p. 245). However, procedures developed to replace important functions of key individuals, such as the Worker-of-the-Week program, *are* practical. First, the Worker-of-the-Week program was inexpensive, costing about $35 per month for supplies, management time, and the lottery payment. In fact, the costs were so low that we felt we could not justify the expense of conducting a component analysis of the program. Second, the program was simple to implement, requiring only that the manager read a short instruction manual and use a checklist. Third, follow-up data collected 5 years after the researcher stopped managing the program indicated that the program was sustainable by the members themselves. As Fawcett, Mathews, and Fletcher (1980) pointed out, these three program characteristics—inexpensive, simple, and sustainable—are critical dimensions of appropriate behavioral technology.

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