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TEACHING JANITORIAL SKILLS TO THE MENTALLY RETARDED: ACQUISITION, GENERALIZATION, AND MAINTENANCE

ANTHONY J. CUVO,[1] RONALD B. LEAF,[2] AND LARRY S. BORAKOVE[3]

SOUTHERN ILLINOIS UNIVERSITY AT CARBONDALE

A task analysis of janitorial skills required for cleaning a restroom was performed. Six subtasks with a total of 181 component responses were identified. Subjects were required to progress through a series of four prompt levels ordered generally from more to less direct assistance for 20 of the most difficult component steps. Another series of four prompts, ordered from less to more direct assistance, was used to teach the other 161 responses. Subjects progressed to the next more intense prompt level contingent on a failure to respond appropriately with less assistance. A multiple baseline across subjects as well as the six subtasks was employed to evaluate the efficacy of the procedures. Six moderately retarded adolescents were trained in their public school. The results show rapid response acquisition, skill generalization to a second restroom, and maintenance of the newly learned behavior. The present research provides evidence of a model for analyzing and training vocational skills to the mentally retarded.

DESCRIPTORS: vocational skill training, task analysis, multiple baseline, janitorial skills, retardates

The trend toward community placement of institutionalized persons increases the need for training programs that prepare these clients for adapting to their new environments. If employment is one of the terminal goals in habilitation of the retarded, then there is a need to integrate vocational skill training into their educational curriculum. However, Gold (1973), in his review of research on vocational habilitation of the mentally retarded, noted the scarcity of experiments evaluating specific manipulations that facilitated acquisition of new vocational behaviors.

Only a small number of these studies delineated training procedures, and a task analysis was a prevalent feature among them. Tasks, such as envelope stuffing (Brown and Pearce, 1970), card assemblying (Brown, Bellamy, Perlmutter, Sackowitz, and Sontag, 1972), drill-press operation (Crosson, 1969), and janitorial work (DeMars, 1975), were broken into sequences of response components to be performed. A task analysis is advantageous because it identifies: (a) prerequisite responses required for completing the task, (b) objectives of training, and (c) sequence of instruction. A task analysis is also pragmatic because it clearly specifies correct responses, which facilitates their reliable scoring.

A second feature common to many vocational experiments is the use of prompting responses. Brown *et al.* (1972) adopted a sequence of prompts to train retarded students to assemble card packages. The training series was: (a) *Verbal Instructions,* (b) *Modelling* + *Verbal Instructions,* and (c) *Physical Guidance* + *Verbal Instructions.* The experimenter applied successive levels of more intense prompts contingent on subjects' demonstrated inability

[1]The authors thank the students and staff of the Curriculum Demonstration Center, Murphysboro, Illinois, for their cooperation during this project. Some of the issues pertinent to this study were clarified by discussion with Roger Poppen and Jesse Williams. Reprints may be obtained from Anthony J. Cuvo, Rehabilitation Institute, Southern Illinois University, Carbondale, Illinois 62901.

[2]Now at UCLA Autism Project, 405 Hilgard, West Los Angeles, California 90024.

[3]Now at Suffolk Developmental Center, Melville, New York 11746.

to perform with less assistance. Variations of the above prompting were employed to train: drill-press operations (Crosson, 1969), simple workshop tasks (Crosson and deJung, Note 1), and bicycle brake assembly (Gold, 1972). Horner and Keilitz (1975) used a similar prompt procedure to teach toothbrushing skills to the mentally retarded.

Cuvo (1973) applied a series of four prompts to teach self-care skills to retarded children. In contrast to the Brown *et al.* procedure, the prompts were sequenced from more to less direct assistance and subjects were required to progress through all four steps, meeting a criterion at each level.

Intensification of instruction on specific task components has been another feature in some training programs. As Crosson (1969) asserted, some tasks invariably require more intensive training; therefore, instructional procedures must be adapted to train effectively and efficiently individual responses that vary in difficulty. This suggestion could be adopted by using the Cuvo required prompt sequence to teach more difficult responses, as well as the Brown *et al.* technique for less demanding ones.

A specific vocation that is practical for the retarded is janitorial service. Janitorial jobs are among the most likely available to relatively unskilled workers when they first enter the job market. Also, employment has not been restricted to higher-functioning individuals; it is an occupation potentially available to the moderately retarded as well.

A search of the literature, however, revealed a scarcity of research validating instructional methods for janitorial skills. In spite of the lack of relevant research, sheltered workshop personnel and special educators teach janitorial skills to handicapped persons daily. Informal observation of such instruction and inspection of curriculum guides makes apparent one or more of the following problems: (a) target behaviors have been inadequately defined, (b) a formal task analysis is either lacking or inadequate, (c) teaching techniques are not clearly specified, and (d) program effectiveness has not been evaluated or the evaluation has been inadequate. These problems call into question the validity and general utility of these programs as teaching devices.

The purpose of the present research was to perform a task analysis of those janitorial skills that are components of cleaning a restroom, evaluate a systematic program to teach mentally retarded adolescents these skills so that they will be performed with quality, generalized to another restroom, and maintained over time. These teaching procedures have been developed in accord with Gold's (1973) recommendations to minimize the need for sophisticated equipment, large sums of money, and highly trained firstline service personnel.

METHOD

Subjects

All 11 pupils in a young adult public school class for the trainable mentally retarded were considered for participation; five were screened out because of frequent absences or motor impairments, which jeopardized skill acquisition. The six experimental subjects, three of each sex, ranged in age from 13 to 15 yr and in IQ from 40 to 50 on the Stanford-Binet Intelligence Scale. All trainees were ambulatory, without sensory or motor impairments, and no major behavior problems. One male was previously diagnosed as autistic.

Materials

Liquid disinfectant, window cleaner, and a brush, all stored in a metal can, were placed outside the restroom door by the experimenter. A broom, dustpan, trash bag, mop, and mop bucket with a wringer, were set next to the can. Paper towels were located in a wall dispenser in the restroom.

Sessions and Setting

All training was provided by the second author and took place within one boys' rest-

room of the school. The room measured approximately 2.6 by 1.8 m and was furnished with a mirror, towel dispenser, urinal, sink, and toilet. A second restroom, used to test for skill generalization, had similar fixtures except that there was no urinal (*i.e.,* it was a girls' restroom).

During baseline, generalization testing, and postchecks, session length was the duration of time required to be tested on the 181 responses. During the acquisition phase, the session consisted of maintenance training on previously acquired subtasks, instruction on the target subtask, followed by testing on all six subtasks. Sessions averaged approximately 20 min, with a range of 15 to 45 min. When possible, all baseline and training sessions were conducted once daily, five days per week, for each subject until all six participants met the training criterion. Because of student absences and unavailability of subjects attending special school programs, each pupil participated, on the average, four days per week.

Task Analysis

A detailed identification and description of the specific behavioral steps and response sequence (*i.e.,* task analysis) of cleaning the restroom were undertaken. Since the school janitor's performance was satisfactory to school administrators and he was willing to provide continuing supervision of students after they were trained, the task analysis was applied to the janitor's method of cleaning the restrooms. To sustain the janitor's motivation to provide maintenance training, it was decided not to modify radically his established procedure. Production of the task analysis involved: (a) direct observation of the school janitor demonstrating his step-by-step procedure for cleaning a restroom, and listing subtasks and their component steps; (b) observation of a videotape of the janitor cleaning the restroom by students in a graduate course on job restructuring for the handicapped, and modifying the initial identification and sequencing of the behavioral components; (c) observation of a videotape of one previously trained retarded student cleaning the restroom in order to examine the degree of correspondence between the janitor's performance and that of the student; and, (d) pilot work with retarded students not subsequently used as subjects to test the applicability of the task analysis.

The job analysis indicated that the complex behavior of cleaning the restroom was composed of six subtasks: (1) cleaning mirror, (2) cleaning sink, (3) cleaning urinal, (4) cleaning toilet, (5) returning equipment, emptying wastebasket, sweeping the floor, and (6) mopping restroom floor. Each subtask, in turn, was composed of 13 to 56 component responses, for a total of 181 steps.[4] Table 1 illustrates the nature of the task analysis by showing the 17 steps for cleaning the sink. Since there was no urinal in the generalization restroom, there were only five subtasks, composed of a total

Table 1

Task Analysis for Cleaning the Sink

1. Take spray cleaner from container.
2. Shake spray cleaner.
3. Spray entire sink with back-and-forth sweeping motions.
4. Replace cleaner in container.
5. Reach over to towel dispenser.
6. Pick up two paper towels.
7. Put paper towels together.
8. Wipe sink sides and edges with back-and-forth strokes.
9. Wipe between faucets with back-and-forth strokes.
10. Wipe faucets by lightly grasping them with towel and twisting back-and-forth.
11. Wipe sink bowl with circular and back-and-forth motions.
12. Turn on cold water.
13. Swish water around bowl with towel.
14. Turn off cold water.
15. Wipe sink bowl again with towel, using circular and back-and-forth motions.
16. Bend over wastebasket, which is located under sink.
17. Throw dirty towels in wastebasket.

[4]The task analysis listing the 181 responses for the six subtasks with the 20 most difficult ones noted, can be obtained from the first author at the address shown in Footnote 1.

of 142 component steps. The task analysis represented an objective, general sequence for training. Within each subtask, it was required that subjects perform each component response in the prescribed sequential order. There was some flexibility, however, in performing the six subtasks. It was necessary to sweep the floor (subtask 5) before mopping it (subtask 6). The other four subtasks did not have a fixed sequence, and could be completed in any order during testing.

Experimental Design

Experimental control was demonstrated by way of a multiple baseline across subjects as well as responses (*i.e.,* subtasks). Initial baseline sessions were administered in two restrooms to establish pretraining competence. Subsequently, subjects were trained to clean the boys' restroom. After meeting the acquisition criterion in that site, skill generalization and maintenance were evaluated in the girls' restroom.

Multiple baseline across subjects. Eight days of baseline performance were recorded for each subject before the first participant received instruction. Training of the succeeding five subjects was initiated at three-day intervals, after their predecessor showed improvement over baseline performance. Baselines were extended for subjects until their training began (*e.g.,* Subject 2, Rick, started training after 11 days of baseline, Subject 3, Mary, began after 14 days of baseline, *etc.*), with successive subjects having progressively longer baselines.

Multiple baseline across responses. To show that direct instruction was functionally related to acquisition and to determine whether performance generalized from one subtask to another, a multiple baseline across subtasks was also employed. The six subtasks were trained sequentially. Subjects were trained on only one subtask per session, but tested on all six.

Generalization across situations. Before training, subjects' baseline janitorial skills were evaluated in two restrooms: one served as the original training site and the second was used to test for generalization. After demonstrating acquisition in the training restroom, subjects' performance was measured again in the generalization restroom. No training was provided at that site; it was used to assess whether subjects' performance would generalize to a similar but novel environment that was not used during acquisition training.

Procedures

Condition of the restrooms. For the first session each day, the restrooms were in their natural state. Before training, they were available for use for several hours by 70 trainable mentally retarded students aged 5 to 21 yr, and showed the normal accumulation of dirt and effects of use. These first sessions constituted probes to the natural environment. Subjects participated randomly and each had several opportunities during the experiment to perform in a naturally dirtied restroom. After the initial session each day, the restrooms were cleaned to quality, then artificially dirtied in a standardized manner. The restroom was dirtied in order to: (a) simulate their natural situation, (b) equate the stimulus conditions across experimental phases for all subjects, (c) facilitate the discrimination that cleaning was necessary, and (d) reliably score response quality.

Testing. The test procedure was administered each session. Before training, it established baseline performance. During instruction, it continued to provide data for the multiple-baseline analysis, and subsequent to training, it showed evidence of generalization and maintenance. During all test sessions, subjects were taken to the restroom and provided with all materials needed for cleaning. They were instructed: "Please clean the entire restroom using these materials." If a subject omitted a subtask, the experimenter said, for example, "What about the toilet?" No subsequent prompting, feedback, or consequences were provided. Sessions were terminated when subjects ceased

to engage in cleaning behaviors and responded affirmatively to the trainer's question, "Are you finished cleaning the bathroom?" The trainer was located in the restroom approximately 1 m in front of the door. The initial baseline sessions were counterbalanced, with half the subjects receiving pretraining assessment in the generalization (*i.e.,* girls') restroom before the training site (*i.e.,* boys' restroom), with the other half receiving the converse sequence. Pretraining baseline lasted for a minimum of four sessions in each of the two restrooms for each subject.

After meeting the acquisition criterion in the training restroom, generalization of performance was evaluated in the second restroom. Testing was continued in that latter setting to measure whether the newly acquired skill would maintain in the absence of prompting and response consequences.

Acquisition training. Pilot work showed that when four subjects were given only verbal instruction as a prompt, performance quality was particularly poor on 20 of the 181 steps of the program. These responses were crucial to the successful completion of the subtasks, did not reoccur throughout the other subtasks, and were difficult to communicate by verbal instruction alone. Since the probability of error seemed quite high for these 20 responses, a procedure that provided highly structured antecedent conditions was considered necessary for shaping skill acquisition on these steps. All participants were required to proceed through a sequence of four prompt levels meeting a performance criterion at each, until the response was performed with acceptable quality with *No-Help.*

The procedures used were: (a) *Verbal Instruction + Modelling*—the trainer verbalized the procedures while he physically performed the step (*e.g.,* "See how I am spraying the mirror around and around."); (b) *Verbal Instruction + Graduated Physical Guidance*—the trainer verbalized the responses to be performed while physically guiding subjects through the step (*e.g.,* "See how we are wiping the sides of the mirror with long strokes.")—guidance was gradually faded; (c) *Verbal Instruction*—the experimenter told subjects what to do (*e.g.,* "Spray the entire sink."); and, (d) *No-Help*—subjects spontaneously initiated and completed the step without verbal or physical prompting. For each of the 20 difficult responses, the trainer provided *Verbal Instruction + Modelling* once; *Verbal Instruction + Graduated Physical Guidance* was then made available until the physical guidance could be faded completely and subjects responded to *Verbal Instructions* alone. When subjects performed a response with *No-Help* one time, they progressed to the next response to be trained. If subjects failed to respond appropriately at any prompt level, the previous level was applied once again. Prompting was employed as needed until the one correct *No-Help* criterion was met.

The other 161 of the 181-step program, pilot work showed, seemed to be more easily acquired without excessive physical prompting. Some were either identical or highly similar across subtasks, and transfer of training was expected. Consequently, a less structured training program was employed for these responses. Teaching proceeded in a sequence of less to more structure, in order to promote speed of acquisition. In contrast to teaching the 20 difficult steps, more direct assistance was provided contingent on subjects' failure to respond appropriately with less guidance.

The training procedures for these 161 steps were: (a) *Verbal Instruction,* (b) *Verbal Instruction + Modelling,* and (c) *Verbal Instruction + Graduated Physical Guidance.* Instruction for these procedures was identical to that described above; however, subjects progressed to the next step only if they did not respond to a lesser prompt within 5 sec or responded inaccurately. If subjects performed the response with acceptable quality given *Verbal Instruction,* they advanced to the next response to be trained.

The six subtasks were taught in the sequential order cited in Task Analysis above, with acquisition training on only one subtask per session. The 20 difficult responses were intermixed with the 161 others across the six subtasks. Each step in the subtask was trained in turn using the designated procedures. The less intensive prompt sequence (*i.e.,* beginning with *Verbal Instruction*) was employed if the response to be trained was one of the 161 less difficult ones. The experimenter switched to the more intensive prompt sequence (*i.e.,* beginning with *Verbal Instruction + Modelling*) when one of the 20 more difficult responses was encountered in the chain of a subtask.

To progress to the next subtask, it was required that 90% of all component steps of the target subtask be completed with *No-Help* at the acceptable standard of quality. Whenever test performance fell below that criterion, training was resumed on that specific subtask until criterion was once again achieved.

Response consequences, employed during training only, consisted of one M&M and praise administered on a variable-ratio schedule, which was thinned over sessions. On the first day of training, consequences were presented subsequent to 62% (*i.e.,* eight) of the 13 mirror-cleaning responses trained (*i.e.,* eight M&Ms were earned). During the second session, consequences were administered twice per subtask. On the remaining training sessions, consequences were presented once per subtask, at their completion. The consumable consequences were given and consumed immediately after the designated response; the session then continued. When a step was performed incorrectly, these positive consequences were withheld until the response was completed accurately.

Maintenance training. Each instructional session included maintenance training of previously learned skills after the first subtask had been learned, and acquisition training of the current target subtask. In principle, there was flexibility in the sequence in which subjects could perform the already acquired subtasks during a session. In practice, however, all participants adopted the sequential order that was employed during training. Subjects were provided with the cleaning materials and initial instructions used during the test condition.

When the responses were performed correctly during maintenance training, M&Ms and praise were administered on the same schedule as during acquisition training. When the step was completed incorrectly, the feedback consisted of five prompt alternatives sequenced in order from less to more direct assistance to subjects. The five levels were: (a) *Confirmation*—the subject correctly verbalized the step and the experimenter confirmed it (*e.g.,* "That is correct, you sweep in front of the sink."); (b) *Non-Specific Prompt*—the experimenter said, "What is next?" and subjects performed the response appropriately; (c) *Verbal Instruction;* (d) *Verbal Instruction + Modelling;* (e) *Verbal Instruction + Physical Guidance.* The latter three prompt levels were employed as defined previously.

After maintenance training on subtasks already mastered, acquisition training was provided for the next target subtask. For example, if subjects were to be trained on the third subtask, cleaning the urinal, on a particular session, they first received maintenance training on cleaning the mirror (subtask 1) and sink (subtask 2). The youths were then trained on the new target behavior, cleaning the urinal. Subsequently, performance on all six subtasks was assessed.

Response Recording and Reliability Checks

The principal dependent measure was proportion correct on the six subtasks during testing. Each of the 181 responses was scored either as being performed correctly with *No-Help* or not being performed correctly. During acquisition and maintenance training, the 181 responses were scored as *No-Help* or one of the several prompt levels described above.

In each phase of the experiment, each of the six subtasks was also rated with respect to

cleanliness. Scoring was dichotomized into two categories: "clean" or "not clean". Clean was operationally defined as when all dirt was removed and there was no residue of cleaning materials (*e.g.,* lint, mop strings, or broom wisks). Failure to meet this criterion resulted in a score of "not clean" for the subtask.

A second person observed independently of and concurrently with the trainer in order to check reliability of scoring. Both primary and secondary observers were graduate students with several years experience performing observational recording. Preprinted data sheets listed either the 181 or 142 janitorial responses in the training or generalization restrooms, respectively; the prompt level required to complete each response (including *No-Help*) was noted next to the response on the sheet. Agreement was also checked for cleanliness. Reliability of scoring was assessed for a total of 10 sessions across all subjects. Checks were made for each subject and during all phases of the experiment.

Observer agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements. An agreement was scored when the observers scored the same prompt level for a response. Proportions of observer agreement on scoring of prompt levels ranged from 0.90 to 1.00, with a mean of 0.96. Interobserver reliability on scoring of response quality (*i.e.,* cleanliness) was 1.00. This included the first session of the day when the restrooms were naturally dirty.

RESULTS

The principal purpose of the experiment was to train mentally retarded youths to perform the janitorial tasks independently. Thus, the test data were analyzed for the proportion of the 181 responses that the six participants performed correctly with *No-Help.* Figure 1 shows data for this dependent variable in each phase of the experiment for two representative subjects, Mary and Tony. Performance on each subtask is plotted separately. When a subject was the first one to participate in the study on a particular day, the restroom possessed the accumulated dirt to that time. Those sessions are indicated by asterisks on the abscissa in Figure 1 for each subject.

Inspection of the individual figures shows relatively stable baseline performance for the six subtasks. There was neither an increment in responding as a function of practice, nor a marked difference between performance in the training and generalization restrooms.

The figure also shows that when training was initiated on a particular subtask, acquisition was extremely rapid; subjects performed at the 90% level on the first session 94% of the time. However, acquisition was specific to the subtask trained. Although some subtasks have several similar component responses, there was no generalized acquisition to responses not yet trained.

As noted in the procedure, acquisition training of 20 of the 181 component responses proceeded through a required sequence of four prompt levels. Only one *Verbal Instruction + Modelling* trial was programmed for each response. Subsequently, *Verbal Instruction + Graduated Physical Guidance* and *Verbal Instruction* were employed sequentially as needed. The results showed that it was generally necessary to use each of these prompt levels only once per response for each subject. On rare occasions, a subject required a second trial on one of these prompt levels for a response.

For the other 161 responses, prompting was provided only as needed. Table 2 shows the proportion of use for the three prompt levels for each training session for the six subjects and six subtasks. It can be seen from the table that although *Verbal Instruction* was the first prompt level employed, it was often necessary to apply more direct assistance to occasion the target responses. The use of *Verbal Instruction + Modelling* and *Verbal Instruction + Physical Guidance* combined ranged from 0.14 (Rick, cleaning sink) to 0.82 (Debbie, mopping) of the trials. The mean proportion of providing

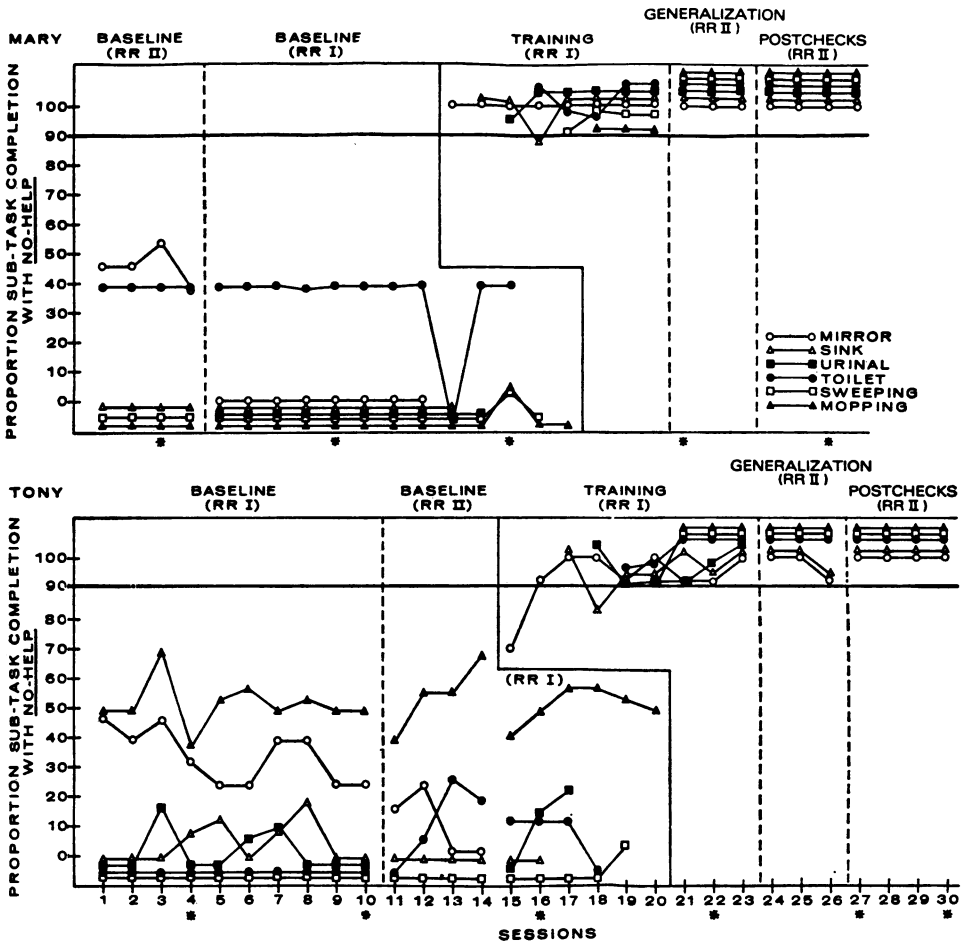

Fig. 1. Proportion of the six subtasks completed with *No-Help* by Mary and Tony in the training (RRI) and Generalization (RRII) restrooms in baseline, training, generalization, and maintenance conditions. Asterisks on the abscissa indicate probes to naturally dirty restrooms.

these two more intense prompt levels was 0.40 for each training session.

Termination of instruction in the training restroom occurred when subjects met the criterion of performing 90% of the 181 responses with *No-Help* at the acceptable quality standard on the test for three consecutive days. In the training restroom, four of the six subjects reached criterion in eight days, the minimal time, while the other two required one extra session. All subjects showed skill generalization to the second restroom. Maintenance of vocational skills is essential in order for the training program to be of practical value. The postchecks on Figure 1 illustrate that skill maintenance occurred over a two-week period.

The preceding analyses reflect subjects' quantitative performance (*i.e.*, the rate at which they completed the 181 steps) on the training program. The quality of performance is an essential consideration in teaching vocational skills, and it was also evaluated in the present experiment. For each of the six subtasks, a dichotomous judgement was made with respect to whether or not they were satisfactorily cleaned. Before training, all subjects' performance was lacking in quality. During the initial baseline, all subtasks for all subjects were rated "not

Table 2

Proportion of three prompt types employed for training the 161 less difficult responses.

Subtasks:	*Mirror* (*10 steps*)		*Sink* (*14 steps*)		*Urinal* (*12 steps*)		*Toilet* (*56 steps*)		*Sweeping* (*27 steps*)		*Mopping* (*22 steps*)	
	Trial 1	*Trial* 2	*Trial* 1	*Trial* 2	*Trial* 1	*Trial* 2	*Trial* 1	*Trial* 2	*Trial* 1	*Trial* 2	*Trial* 1	*Trial* 2
Subject—Ed												
Verbal Instructions	0.70	—	0.79	0.57	0.66	—	0.66	—	0.67	—	0.64	—
Verbal Instructions + Modelling	0.10	—	0.14	0.29	0.22	—	0.21	—	0.22	—	0.23	—
Verbal Instructions + Physical Guidance	0.20	—	0.17	0.14	0.12	—	0.13	—	0.11	—	0.13	—
Subject—Rick												
Verbal Instructions	0.70	—	0.86	0.86	0.69	—	0.64	—	0.52	—	0.64	—
Verbal Instructions + Modelling	0.20	—	0.07	0.14	0.25	—	0.18	—	0.30	—	0.18	—
Verbal Instructions + Physical Guidance	0.10	—	0.07	0.00	0.06	—	0.18	—	0.18	—	0.18	—
Subject—Mary												
Verbal Instructions	0.60	—	0.57	0.72	0.44	—	0.61	—	0.63	—	0.55	—
Verbal Instructions + Modelling	0.30	—	0.14	0.14	0.37	—	0.26	—	0.15	—	0.32	—
Verbal Instructions + Physical Guidance	0.10	—	0.29	0.14	0.19	—	0.13	—	0.22	—	0.13	—
Subject—Tony												
Verbal Instructions	0.50	0.40	0.72	0.72	0.66	—	0.73	—	0.56	—	0.41	—
Verbal Instructions + Modelling	0.30	0.30	0.14	0.14	0.19	—	0.14	—	0.26	—	0.36	—
Verbal Instructions + Physical Guidance	0.20	0.30	0.14	0.14	0.15	—	0.13	—	0.18	—	0.23	—
Subject—Debbie												
Verbal Instructions	0.50	—	0.43	—	0.50	—	0.62	—	0.33	0.40	0.18	0.32
Verbal Instructions + Modelling	0.40	—	0.43	—	0.28	—	0.25	—	0.41	0.30	0.46	0.32
Verbal Instructions + Physical Guidance	0.10	—	0.14	—	0.22	—	0.13	—	0.26	0.30	0.36	0.36
Subject—Carol												
Verbal Instructions	0.70	—	0.79	—	0.75	—	0.77	—	0.74	—	0.55	—
Verbal Instructions + Modelling	0.20	—	0.21	—	0.15	—	0.16	—	0.15	—	0.27	—
Verbal Instructions + Physical Guidance	0.10	—	0.00	—	0.10	—	0.07	—	0.11	—	0.18	—

clean". However, after training, all participants met the quality criterion for all subtasks.

DISCUSSION

This study provided a model for analyzing and teaching vocational skills to mentally retarded youths. The results attest to the utility of the present janitorial training program. The experimental procedures occasioned rapid acquisition, generalization of the skill to a new environment, and maintenance of performance. Subjects were able to initiate and execute spon-

taneously the 181 component responses for the six subtasks following an average of 2.67 hr of actual training. The multiple baselines demonstrated that neither the passage of time nor practice on other responses accounted for the results; performance did not improve until training was initiated for each subject and subtask.

Examination of generalization and maintenance is rare in the vocational literature, although these two characteristics are essential for successful employment. The results showed that generalization across subtasks did not occur; acquisition was contingent on training each subtask individually. However, generalization of learning to another quite similar restroom did occur, and performance maintained in that new environment during the following two weeks. Since training was not provided during the generalization tests, that phase also provided evidence of response maintenance. To the degree that other restrooms may differ (*e.g.,* with respect to their fixtures), additional instruction may be necessary in the new environment; substantial transfer of training should obtain, however, given the common design of such facilities.

Another finding was that performance maintained when response consequences were not provided during the postcheck phase. This was a rather stringent condition, since feedback is frequently provided to janitorial workers in sheltered or competitive employment. Subjects were not specifically told on postcheck sessions that consumable reinforcers would be withheld. Performance may have maintained in the absence of tangible consequences because success at the task itself became reinforcing. Motivation for performing such vocational tasks may have been high because the students aspired to be accepted by the local sheltered workshop.

These results concurred with those of other investigators who performed a task analysis of vocational skills (Brown *et al.,* 1972; Brown and Pearce, 1970; Crosson, 1969; DeMars, 1975). As suggested in these previous investigations, a task analysis facilitated training by identifying the sequence of relevant responses in the target subtask, and aiding reliable response scoring. The present investigation extended DeMars' (1975) task analysis of janitorial skills by performing a detailed identification and description of the specific component responses and their sequence for cleaning a restroom.

An essential feature of the present procedure was the prompt sequence. The present investigation supported other researchers' use of a series of prompts to train skill acquisition (Brown *et al.,* 1972; Brown and Pearce, 1970; Crosson, 1969; Crosson and deJung, Note 1; Cuvo, 1973; DeMars, 1975; Gold, 1972; Horner and Keilitz, 1975). Support was provided for Crosson's (1969) assertion that, in a complex vocational training program, component responses may vary in difficulty and the more demanding ones benefit from more intensive instruction. Thus, two prompt sequences were employed in the present investigation. One required intensive direct assistance to train 20 difficult steps. This procedure most probably minimized subjects' error rate on responses likely to be emitted inaccurately. For the less difficult steps, more intensive instruction was provided only contingent on the subjects' need for such training. Such a bifurcated training approach is efficient because intensive training efforts can be devoted to responses that are difficult to occasion. For the 20 difficult responses in this experiment, one trial each of *Verbal Instruction + Modelling* and *Verbal Instruction + Physical Guidance* generally contributed sufficiently to acquisition that typically only one trial of *Verbal Instruction* was required.

The results replicate and extend past findings (Brown *et al.,* 1972; Brown and Pearce, 1970; Crosson, 1969; DeMars, 1975) which demonstrate the combined effectiveness of a task analysis, sequence of prompts, and response consequences to train vocational skills to the mentally retarded. The present study expands the vocational literature by demonstrating the

applicability of the program to train a complex task to younger and lower-level retarded persons. Previous research was directed predominately at training mildly retarded adults on tasks with fewer component responses. This investigation, in contrast, demonstrated that moderately retarded youths could be trained to perform a series of 181 responses.

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