TEACHING MENDING SKILLS TO MENTALLY RETARDED ADOLESCENTS

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This experiment presents a model for analyzing community living skills and teaching them to mentally retarded adolescents. A task analysis of three mending skills was developed and validated, aided by consultation with persons having expertise in home economics and mental retardation. The task analysis was modified to compensate for the constraints imposed by the trainees' disabilities. Five moderately retarded youths received training on sewing hems, buttons, and seams. Sewing skills were acquired rapidly and maintained. The behavior generalized from trained to untrained tasks on their common components for all subjects. A multiple baseline across participants combined with a multiple baseline across responses demonstrated the combined effectiveness of an objectively validated, detailed task analysis; graduated sequence of prompts; and response consequences in training and maintaining community living skills with mentally retarded adolescents.

DESCRIPTORS: community living skills, mending, multiple baseline, mentally retarded adolescents

Presentability has been defined as a goal for rehabilitation clients who live in the community (Sanders, 1976). To the degree that integration into society is enhanced by physical appearance, promoting presentability should be a major objective. A skill that may increase the presentability of retarded persons is mending clothing using handstitching. This skill would increase their ability to care for themselves and may promote awareness of personal appearance. Additionally, mending clothing is a potentially economical activity; it increases garment lifetime and reduces the need to purchase new clothing. Handstitching, unlike machine sewing, requires few, inexpensive, and easily obtainable materials. The purpose of the present research was to (a) produce a task analysis of three common mending tasks, (b) validate the content of the

task analyses, and (c) evaluate a systematic program for instructing mentally retarded adolescents in these skills.

METHOD

Participants

Participants were five trainable mentally retarded adolescents attending public school. There were four males and one female ranging in age from 17 yr 2 mo to 20 yr 6 mo. They were chosen on the basis of their scores on a screening test developed to measure 6 prerequisite skills: identification of sewing materials, needle threading, pinning, knot tying, and button and thread selection. The trainees scored highest among their classmates on this test, and were unable to perform the three target tasks.

Sessions

Session length was the time either (a) to conduct acquisition or maintenance training on one of the three mending skills, or (b) to administer the Sewing Skills Test. The mean train-

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ing session duration was 17 min with a range of 10 to 45 min.

Task Analysis and Validation

Initially, the experimenter and two graduate students each examined her own wardrobe, and recorded needed mending repairs. With two home economists and a special educator who taught sewing, the types of repairs were evaluated with respect to their feasibility of training and utility for the experimental population. The mending skills selected were: sewing on buttons, mending seams, and repairing hems.

Table 1

Task analysis of hemming—use of a blind or seed stitch.

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1. Verbalize task to be completed.
 2. Select an appropriate color of thread.
 3. Pin the material with straight pins so there is a smooth folded edge on which to sew.
 4. Thread the needle with approximately 60 mm of thread.
 5. Tie a knot in the ends of the thread so there is a double thickness of thread.
 6. Pick up the material with the nondominant hand with the folded edge facing you.
 7. Using the dominant hand, insert the needle under the folded edge.
 8. Poke the needle up through the folded edge.
 9. Grasp the needle with the thumb and the index finger from the top of the fold and pull the needle until the knot catches.
 10. Reverse the needle direction so that it is facing the folded edge.
 11. With the tip of the needle, pick up several threads of the cloth just below the folded edge (within 0.5 mm).
 12. Poke the needle through the folded edge.
 13. Push the needle 0.5 to 2 mm through the folded edge in the direction of the unmended portion of the hem.
 14. Poke the needle through the folded edge so that the tip emerges facing you.
 15. Pull the thread entirely through the folded edge.
 16. Stop pulling the thread before the material bunches.
 17. Recycle to Step 9 until the last stitch is made, approximately 2 mm past the rip.
 18. Tie a knot within 0.5 mm of the hem edge.
 19. Clip the thread near (within 2 mm of) the knot between the needle and the knot.
 20. Remove the pins from the garment and stick them into the pin cushion.
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Next, *Clothing repairs* (1975) and the professionals cited above were consulted for appropriate sewing methods. The backstitch was selected for repairing seams, and the blind or seed stitch for hemming. Buttons, which did not require a stitch, were sewn horizontally or vertically. The three skill experts and two graduate students, each with varying degrees of sewing skill, were observed modeling the three sewing tasks. Differences in technique among the models were discussed until consensus was obtained on the easiest and most efficient procedures.

Next, preliminary task analyses were written for each of the tasks using the agreed-on steps. The experts then performed the three sewing behaviors to evaluate whether the steps were necessary, sufficient, and sequenced efficiently. The ultimate content-valid task analyses consisted of 21 steps for sewing on a button, 20 for repairing a hem, and 37 for mending seams. The task analysis for hems is shown in Table 1 as an illustration.

Materials

Ten items were selected from 62 usable garments obtained, and marked for stitch length (*i.e.*, a hem would be marked with dots spaced to indicate appropriate placement of stitches). The remaining 52 were the core garments for training.

Materials Validation

Completion of each of the three sewing tasks required that participants choose an appropriate color of thread. Additionally, the button task required selection of a button similar in size and color to those already on the garment. Participants were trained to select the best thread and button from four alternatives for each.

Thread selection validation. From 34 spools of thread, the trainer chose the one that she thought was the best match for each garment, and randomly selected a spool from that same color family and two spools from different color families. Next, the three skill experts selected

one of the four spools which they thought was the best match for each garment. Any garment-thread combination that did not receive 100% agreement was rematched with another thread, and re-presented. When 100% agreement was attained, that thread became the validated response.

Ten students from the subject pool were presented the garments and four associated spools of thread, and asked to identify the correct one for each garment. Items were rank ordered based on the percentage of students selecting the correct answer.

Button selection validation. The procedure for validation of button selection was similar to that used for thread, except that one of the four choices was a button from the garment itself. Since there was an objectively accurate response, interexpert agreement was unnecessary for validation. The same 10 students from the subject pool were tested, as described above, to determine button selection difficulty.

Training and testing clothing groups. The 52 garments were categorized by the sewing tasks that could be performed on them: buttons, hems, and seams. The items within each of the three sewing skills were divided into training and testing subgroups matched on type of garment and difficulty of the thread and button selection.

Experimental Design

A multiple baseline across subjects was used to demonstrate experimental control. Additionally, a multiple baseline across responses strategy was included to assess possible generalization across the three sewing tasks.

All participants received training sequentially, with the introduction of instruction for the last four contingent on the previous trainee meeting criterion on the first task. The sequence of training the three tasks was counterbalanced across the five participants. The criterion for advancing from task to task was a training session with 100% of all component steps of the target

behavior performed independently, and 100% accuracy on all steps for that task on the Sewing Skills Test.

Principal Dependent Measure

The Sewing Skills Test was comprised of the steps of the task analysis for each of the three sewing skills. Each step was scored as being performed with *No-Help* or not performed with *No-Help*. The percentage of items performed with *No-Help* was the principal dependent variable. The Sewing Skills Test was administered: (a) prior to training, (b) immediately after criterion was attained for each of the three tasks, and (c) as a 1- and 2-wk follow-up.

During testing participants were asked, "What mending task needs to be done on this garment?" If they did not respond correctly, the task was specified and students were asked to make the appropriate sewing response. No subsequent help, feedback, or consequences were provided.

Since rip size and acceptable stitch lengths varied across garments, participants were required to sew the entire rip correctly in order to receive credit for the response.

Acquisition Training

Acquisition training occurred on only one task per session. The garment and materials to complete the task were placed on the table in front of participants, and the experimenter said: "There is something on this garment that needs to be sewn. What mending task needs to be done on this (name of garment)?" If participants did not identify the task, the experimenter did so. After the task had been specified, the experimenter instructed, "Using these materials, please (e.g., sew a button on the shirt)." Prompts were provided when necessary. Each step of the task analysis received only one score, the most intensive prompt used. The criterion for completion of acquisition training was performing 100% of all steps of the target task analysis with *No-*

Help during both a training session and the subsequent Sewing Skills Test.

Prompt sequence. The prompting procedures were: (a) *No-Help*—participants completed the task without prompting after identifying the mending procedure to be performed; (b) *Verbal Instruction*—the trainer verbalized the appropriate step and the participant performed the task; (c) *Verbal Instruction and Modeling*—the trainer verbalized the step while physically performing it, after which the participant imitated; (d) *Verbal Instruction and Physical Guidance*—the trainer verbalized the step while physically guiding the student through it; (e) *Verbal Instruction and Visual Cue*—the trainer verbalized the response to be performed after having marked the stitch length on the garment with dots. This level of prompting was available only for stitch length and correctly positioning the button. To aid button positioning, participants were given a ruler and a felt tip pen and asked to draw a vertical line from the other buttons on the garment, and a horizontal line from the button hole. Participants were then asked to place the button at the intersection of the two lines. After trainees performed with *Verbal Instruction and Visual Cue*, the cue was removed and they were given the opportunity to perform the next step with *No-Help*.

Participants were provided with a more structured prompt only if they failed to respond appropriately to a less direct prompt within 5 sec. If they performed accurately, students advanced to the next step of the task analysis.

Consequences. Experimenter praise and information feedback were used as consequences for responses. Every fourth correct response was followed by praise. On the first day of training, participants were shown a graph with the proportion of steps completed with *No-Help* on the ordinate and the session numbers on the abscissa; their last Sewing Skills Test score was marked on it. Students received a red star on the chart every time their performance was better than that on their previous session. A gold star and praise were given when 100% of all steps were

performed correctly with *No-Help*. If subjects did not improve, a check mark was placed on the chart.

Maintenance Training and Generalization Testing

If performance on a previously trained task fell below the 100% criterion on the Test, maintenance training was implemented during the next session. Materials, general instructions, consequences, and criteria for completing maintenance training were the same as during acquisition. There were two minimal prompts added to those originally employed: (a) *Confirmation*—the participant correctly verbalized the step and the trainer confirmed it (e.g., "That is correct, you tie a knot in the thread now."); (b) *Nonspecific Prompt*—when a student failed to perform the task within 5 sec, the trainer said, "What is next?" and the participant responded appropriately.

Reliability

A graduate student scored responses concurrently with the trainer on 34% of Sewing Skills Tests and 17.5% of all training sessions. Inter-observer agreement was scored when both credited the same prompt level for a response. Reliability, calculated by dividing the number of agreements by the number of agreements plus the number of disagreements multiplied by 100, ranged from 97.4% to 100%.

RESULTS

Sewing Skills Test

Figure 1 shows the percentage of steps of the Sewing Skills Test performed with *No-Help* for the five participants in each phase of the experiment. Inspection of individual figures shows relatively stable baselines for all three tasks. Responding did not increase as a function of practice, history, or other confounding factors. Prior to instruction, all tasks were performed below 35% correct, substantially below the criterion level.

Fig. 1. Performance on Sewing Skills Test in various phases of the experiment for five mentally retarded adolescents.

The figure also shows that after the acquisition criterion had been attained on the first task, some generalization to the two untrained tasks occurred regardless of the order in which they were trained. All three tasks had several similar components responses; generalization most often occurred on these repetitious behaviors (e.g., threading needles, tying knots, selecting appropriate thread).

Figure 1 shows that maintenance occurred with no retraining necessary for three of the five participants. However, maintenance training was necessary for two students after the 1-wk follow-up. Bob attained the 100% *No-Help* level after only one retraining session, and Mike required two. All five participants maintained the 100% criterion on the 2-wk follow-up test.

Training Data

The necessity of prompting decreased over trials for each task and for all participants. *Verbal Instruction and Physical Guidance* was required only for Dawn and Mike on seams and hems. Averaging over trials, teaching hems required the most *Verbal Instruction* and *Verbal Instruction and Modeling* for all except Bart and Dawn, respectively. *Verbal Instruction and Visual Cue* was never required at any time during training.

Cost Effectiveness Analysis

The value of the materials consumed in the experiment was \$6.00. Only the thread used was nonrecyclable. Trainer time could be estimated at \$4.26 per hour, the wage of teacher aides employed at the school where the experiment took place. The average training cost per participant for all three skills was \$19.94 with a range of \$13.28 to \$35.28. Testing costs averaged \$20.73 with a range of \$16.69 to \$26.63.

DISCUSSION

This study provided a model for analyzing community living skills and teaching them to mentally retarded adolescents. The results attest

to the utility of the mending skills training program; the procedures occasioned not only rapid acquisition, but also maintenance of performance. Dawn and Rob showed the experimenter garments they had mended at home with no help after the follow-up tests were administered. Dawn sewed a hem appropriately and Rob used a backstitch to mend a pocket, an untrained application of the stitch. This indicates not only that there was generalization both out of the training environment and to a new application of the stitches, but also that participants were already deriving economic benefits from instruction.

Trainers of mentally retarded persons sometimes claim that their students are extremely slow to acquire new skills and require much intensive prompting. The present research provides contradictory evidence. Rigorous application of behavioral principles to instructional design resulted in rapid and efficient learning by retarded adolescents.

The experimental design used in this research was a multiple baseline across subjects and responses. Experimental control was demonstrated by the former, and the latter strategy permitted monitoring participants' possible skill generalization. The combined design seems advantageous in instructional research where generalization across responses may be likely.

The results replicate and extend past findings (Cuvo, Leaf, and Borakove, 1978; Risley and

Cuvo, in press; Cuvo, Jacobi, and Sipko, Note 1) that demonstrated the combined effectiveness of a task analysis, graduated sequence of prompts, and response consequences, to teach community living skills to mentally retarded students. In the absence of a component analysis or direct comparison of this instructional package with alternative techniques, it is not possible to state which elements were primarily responsible for acquisition or whether this program is more effective than other procedures.

REFERENCE NOTE

1. Cuvo, A. J., Jacobi, E., and Sipko, R. J. *Teaching laundry skills to mentally retarded adults*. Manuscript submitted for publication, 1978.

REFERENCES

- Clothing repairs*. (Home and Garden No. 107, U.S. Department of Agriculture). Washington, D.C.: U.S. Government Printing Office, 1975.
- Cuvo, A. J., Leaf, R. B., and Borakove, L. S. Teaching janitorial skills to the mentally retarded: acquisition, generalization, and maintenance. *Journal of Applied Behavior Analysis*, 1978, **11**, 345-355.
- Risley, R. and Cuvo, A. J. Training mentally retarded adults to make emergency telephone calls. *Behavior Modification*, in press.
- Sanders, R. M. Presentability as a goal for work activities clients. *Vocational Evaluation and Work Adjustment Bulletin*, 1976, **9**(2), 15-19.

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