DOCUMENT RESUME

ED 242 157 EC 162 127

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TITLE Investigating Skill Transfer from a Domestic Training Site to the Actual Homes of Three Severely Handicapped Students.
INSTITUTION Madison Public Schools, Wis.; Wisconsin Univ., Madison.
SPONS AGENCY Office of Special Education and Rehabilitative Services (ED), Washington, DC. Div. of Innovation and Development.; Office of Special Education and Rehabilitative Services (ED), Washington, DC. Div. of Personnel Preparation.
PUB DATE [83]
GRANT G008102099; G008302977
NOTE 28p.; Reduced tables may not reproduce.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Adaptive Behavior (of Disabled); *Daily Living Skills; *Severe Disabilities; *Transfer of Training

ABSTRACT

The study was designed to investigate transfer of training for a nonschool Domestic Training Site (DTS) to the actual homes of three severely handicapped students aged 9-11. Pre- and posttest measures were secured in both the DTS and actual homes. All instruction occurred in the DTS. Phase I was designed to investigate the extent to which the students transferred the responses to relevant cues acquired in the DTS to their actual homes. Although many responses were both acquired and transferred, they were not judged instructionally acceptable. Responses that were not acquired, and therefore were not transferred, became the instructional targets of Phase II. Significant skill transfer would result if a student were taught to respond to cues in the DTS that more closely approximated those available in his or her actual home. This replicative strategy produced significantly greater skill transfer when compared to the original strategy used during Phase I. (Author/CL)

INVESTIGATING SKILL TRANSFER FROM A DOMESTIC TRAINING SITE TO THE ACTUAL HOMES OF THREE SEVERELY HANDICAPPED STUDENTS*

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*This paper was supported by Grant #G008102099 to the University of Wisconsin-Madison from the U.S. Department of Education, Office of Special Education, Division of Personnel Preparation, Washington, D.C.; and by Grant #G008302977 to the University of Wisconsin-Madison from the U.S. Department of Education, Office of Special Education, Division for Innovation and Development, Washington, D.C.

Abstract

This study was designed to investigate transfer of training from a nonschool Domestic Training Site (DTS) to the actual homes of three severely handicapped students, ages 9, 9, and 11. Pre- and post-test measures were secured in both the DTS and actual homes. All instruction occurred in the DTS. Phase I was designed to investigate the extent to which the students transferred the responses to relevant cues acquired in the DTS to their actual homes. Although many responses were both acquired and transferred, they were not judged instructionally acceptable. Responses that were not acquired, and therefore were not transferred became the instructional targets of Phase II. Phase II was designed to investigate whether more instructionally significant skill transfer would result if a student were taught to respond to cues in the DTS that more closely approximated those available in his or her actual home. This replicative strategy produced significantly greater skill transfer when compared to the original strategy used during Phase I. Educational implications are discussed.

Investigating Skill Transfer from a Domestic Training Site to the Actual Homes of Three Severely Handicapped Students

Over the decades a substantial amount of attention has been given to the learning and performance phenomenon of generalization or transfer of training. From some of the earliest studies, educators were made aware of the notion that the closer the training stimuli approximate the stimuli to which skill transfer is sought, the greater the probability that transfer of training will occur (Gibson, 1941; Yum, 1931). Despite the inherent logic and early documentation of this notion, attempts to apply it to the education of severely handicapped students have been limited. One attempt was made by Rincover and Koegel (1975) who systematically incorporated the physical stimuli available in a training environment, i.e., tables and chairs, into the generalization environment in a study involving students with autism. This technique seemed to facilitate generalization of imitation and direction-following skills by all four students who did not exhibit it in the absence of such programming. Stokes and Baer (1977) in their review of the generalization literature later referred to the procedure of incorporating into training environments social and physical stimuli that are also salient in the generalization or transfer environments as Programming Common Stimuli.

The study by Rincover and Koegel, and many other successful attempts to program common stimuli involved the use of a laboratory setting as the training environment and a classroom as a transfer environment (Koegel & Rincover, 1974). Since the midseventies, when these studies were conducted, the educational goals for severely handicapped students have changed considerably. As more and more educators became aware of the vast discrepancies between the skills taught in classrooms and those required for functioning in a wide variety of heterogeneous community environments (Brown, Nietupski, & Hamre-Nietupski, 1976), educational goals shifted to emphasize community functioning. Today, it appears that the environments of concern are no longer relatively controlled classrooms, but the many nonschool environments in which a severely handicapped student currently functions or might function in the near future.

In light of this emphasis on community functioning, more recent applications of programming common stimuli have focused on the effectiveness of strategies designed to facilitate skill transfer from a training environment to a specific community environment. For the most part, the strategies employed involved the incorporation of relevant stimuli from the community environment into a classroom setting. Several researchers have reported that severely handicapped students who were taught bus riding skills (Neef, Iwata, & Page, 1978), street crossing skills (Page, Iwata & Neef, 1976), and fast food restaurant skills (van den Pol, et al., 1981) in training environments designed to simulate the actual settings, actually generalized many skills to nontraining environments. Other studies, however, have reported poor generalization, despite the use of simulation techniques. Hill, Wehman, and Horst (1982) reported that a significant decrease in performance

occurred from [redacted] to nontraining environments for students who were taught to [redacted]all machines despite the incorporation of stimuli from the nont[redacted]vironments into the training environments. Coon, Vogelsberg, an[redacted] (1981) reported negligible skill transfer to an actual bus when a [redacted]y handicapped woman was taught bus riding skills in simulated settin[redacted]he contradictory findings of Neef et al. (1978) and Coon et al. (198[redacted]r the same activity, bus riding, have focused attention on competing factors which can influence generalization. Coon et al. (1981) suggested that discrepancies in their findings and those of Neef et al. might be attributable to differences in factors such as the unique learning and performance characteristics of the participants, the amount of previous training in nonschool environments, and the training procedures employed.

While many educators continue to investigate the use of classrooms as training environments, others have opted for the use of nonschool-only training strategies (Brown et al., 1983). Given that the relevant features of many community environments cannot be approximated effectively in classrooms, direct instruction in nonschool environments is proposed as one strategy to ameliorate the difficulties associated with transfer of training. Presumably, when instruction occurs in a nonschool environment, the skill transfer difficulties of a severely handicapped student can be circumvented entirely if the instruction occurs in the actual community environments utilized by the student during nonschool hours (e.g., his or her home). However, since rarely is it feasible for a teacher to provide instruction only in the actual nonschool environments of concern, instruction is likely to occur in nonschool environments similar to, but not the same as, the generalization environments of concern. Consequently, skill transfer problems can now be expected from one nonschool environment to another. Undoubtedly, the stimuli available in one nonschool environment, e.g., a teacher's apartment which is used for domestic training purposes, will vary significantly from the stimuli to which a student must respond in another nonschool environment, e.g., his or her actual home. Thus, in addition to investigating transfer of training from simulated school to nonschool environments, transfer of training from a nonschool training environment to the actual nonschool environment of ultimate concern must also be addressed.

This study was designed to investigate the transfer of training of severely handicapped students from a nonschool domestic training site to their actual homes. Two questions were of primary concern. The first question, addressed in Phase I, was:

> To what extent will the students transfer responses to relevant cues acquired in a nonschool Domestic Training Site (DTS) to their actual homes?

Accordingly, pretest measures of functioning in four activities were secured in the actual home of each student as well as in a DTS. Instruction was then provided in the DTS. Post-test measures were then taken both in the DTS and in the actual homes. Attempts to determine the extent to which the skills acquired in the DTS transferred to each actual home were then made.

The second question, addressed in Phase II, was:

Would an instructional strategy which used many of the specific cues available in actual homes result in more transfer than an instructional strategy that used the cues available only in a DTS?

The students were returned to the DTS and received direct instruction on the skills acquired in Phase I that did not transfer to their actual homes. Two instructional strategies were used: a simulation strategy from Phase I in which a student was taught to respond to only those cues available in the DTS, and a replicative strategy in which a student was taught to respond to cues that more closely approximated those available in his or her actual home. Post-test measures were then taken in the DTS and in the actual homes. Attempts to determine whether greater skill transfer occurred as a result of the replicative strategy or the original strategy were then made.

Phase I

Method

Students

Three students, ages 9, 9, and 11, were selected from a special education classroom of eight in the Madison Metropolitan School District, Madison, Wisconsin. All three resided in their natural homes and attended a regular elementary school. The major selection criteria included a diagnosis of moderate or severe mental retardation as a primary handicapping condition, and the existence of objectives in Individualized Education Programs (IEP) that were specifically related to functioning in a domestic environment.

Alice, an ambulatory 9-year-old female had attended public school for five years during which time she lived with her mother. Medical and psychological records contained diagnoses of mild cerebral palsy, moderate mental retardation, and reports which indicated that she had functional vision and hearing and could communicate verbally using two-to-three word utterances. Her mother reported that since she recently acquired a full time job, Alice should begin to help with household chores. Prior to this investigation, Alice's participation in housekeeping and meal preparation activities was minimal and she had not received systematic instruction in a DTS as a component of her school program.

Bruce, an ambulatory 9-year-old male, had attended public school for six years during which time he lived with his parents and two siblings, a 6-year-old male and a 2-year-old female. Psychological records contained a diagnosis of moderate mental retardation and reports which indicated that he had functional vision and hearing and could communicate verbally in sentences of up to six words. Prior to this investigation, his parents reported that he was expected to help out at home by putting his games away and feeding his dog. Bruce had not received systematic instruction in a DTS as a component of his school program.

Scott, an ambulatory 11-year-old male, had attended regular public school for seven years during which time he lived with his mother and father. Medical and psychological records contained diagnoses of severe mental retardation and reports which indicated that he had significant visual impairments. However, educational progress reports established that he was able to use visual information in a variety of settings. For example, reports noted that his visual difficulties did not interfere with the accuracy with which he located food items in a grocery store. While he could communicate verbally using two to three word utterances, unfamiliar persons had difficulty interpreting his speech, thus, he was learning to use a picture communication booklet containing approximately 20 symbols as a backup system. His parents reported that he helped make his bed and picked up toys for which he received a weekly monetary allowance. Scott received instruction in a DTS during the school year prior to this investigation. Specifically, he received instruction on a sequence of personal hygiene skills and such household tasks as washing dishes, wiping tables and making a bed. At that time he required physical and verbal prompts to complete the sequence of skills in each activity.

Setting

All training occurred in a DTS located approximately two miles from the elementary school. It was the actual home of one of the students in the class who was not a participant in the study. The DTS was a split level one family dwelling with a family room and a half bathroom on the ground level, a kitchen and living room on the next level, and three bedrooms and full bathroom on the third level. The students received instruction in all rooms but the dining and living rooms on a variety of domestic activities. The actual homes of the students served as transfer environments.

Activities

All students received instruction on four activities: putting away silverware; preparing toast; folding socks and towels and putting them away; and making a sack lunch. The selection of these activities was based on: input from parents (see the Parent Inventory presented in Table 1); the teacher's knowledge of longitudinal needs; and the frequency at which these activities occurred in actual homes.

An ecological inventory strategy was used to delineate the skills required to initiate, proceed through, and complete an activity (Brown et al., 1980). Specifically, this strategy involved: entering the DTS environment; recording the performances of nonhandicapped individuals as they engaged in the activity of concern; and delineating the cues under which those performances occurred. An example of one ecological inventory, preparing toast, is presented in Table 2.

Response Measures

A four-point measurement system was used to secure performance information in relation to each skill of each activity. Specifically,

Table 1

A Parent Inventory of Meal Preparation and Housekeeping Activities

Dear _____,

Below is a list of meal preparation and housekeeping activities in which your child may participate at home. Please check the appropriate column(s) to give us an indication of the nature of your child's participation and whether you would like this activity included in his or her IEP.

Thank you,

_____

Activities	My child does this routinely without supervision	My child does this routinely, but reqrs. supervision	My child does not particip. in this activity	If the school would teach needed skills, I would try to involve my child in this activity at home
I. Meal Preparation				
A. Makes a sack lunch				
- selects food				
- prepares				
- packages				
- puts away food items				
- cleans up area				
- other (please list)_____				
B. Makes breakfast				
- selects food				
- makes toast				
- prepares a bowl of cereal				
- other (please list) _____				
C. Makes a snack (please list) _____				
D. Sets table				
E. Cleans up				
- clears table				
- washes dishes				
- dries dishes				
- puts away dishware				
- puts away silverware				
- other (please list) _____				
II. Housekeeping				
A. Vacuums				
B. Dusts				
C. Sweeps				
D. Makes bed				
E. Empties trash				
F. Puts personal items away				
G. Does the laundry				
- sorts according to color				
- uses washer				
- uses dryer				
- sorts and folds clean laundry				
- hands clothes				
- puts away clean clothes				

Table 2

An Ecological Inventory of "Preparing Toast" in the Domestic Training Site

Cues	Skill Sequence
1. kitchen (initial directions)	1. moves to kitchen
2. bread box located on the counter	2. obtains a loaf of bread
3. toaster positioned on the counter against the wall	3. arranges toaster by pulling it out
4. wound cord and plug	4. unwinds cord, holds onto plug
5. outlet on the wall above the counter	5. plugs end into outlet
6. white slide button and words light/dark	6. adjusts light/dark controls on toaster
7. closed bag	7. removes twist tie
8. open bag	8. takes out 2 slices of bread
9. empty slot	9. puts 1 slice in slot
10. other empty slot	10. puts other slice in slot
11. black lever (1½" wide)	11. pushes lever down
12. plate in the cupboard over the counter	12. takes out plate
13. toasted bread and the sound of the toaster as the bread popped up	13. takes toast out with fingers
14. plate on the counter	14. puts toast on plate
15. butter dish in the refrigerator	15. obtains butter
16. knife in the silverware drawer next to sink	16. grasps knife
17. butter and knife on counter	17. slices off end of butter with knife
18. dry toast on the plate on the counter	18. spreads butter on toast
19. buttered toast and the refrigerator	19. puts butter away
20. dirty knife and the sink	20. puts knife in sink
21. open bag	21. re-wraps bread
22. closed bag and location of bread in the bread box	22. puts bread away
23. plug in outlet	23. unplugs cord of toaster and winds
24. its original location against the wall	24. puts toaster away by pushing it against the wall

a plus (+) or minus (-) was recorded to indicate whether the student correctly or incorrectly:

initiated the response;

responded to the relevant natural cues;

performed the actions in a topographically acceptable manner; and

performed the actions in a qualitatively acceptable manner.

For example, under the measurement system typically used by the teacher, Scott would have recieved a (+) if he obtained the bread and a (-) if he did not. Although the (-) would indicate that he did not obtain the bread, it would not indicate whether the error occurred because he did not respond to the relevant natural cues which were specific to that site, e.g., the bread was located in the bread box in the DTS. In fact, the error might have occurred: because he did not initiate the response by moving toward a location in which the bread would likely be found, e.g., a cupboard, the refrigerator, and/or a bread box; because he did not perform the actions in a topographically acceptable manner by opening the bread box and grasping the loaf of bread; and/or because he did not perform the actions in a qualitatively acceptable manner by grasping the bread with reasonable pressure.

A response was categorized using this four-point system to provide more precise information about the nature of an error which would subsequently allow a more specific analysis of transfer of training difficulties. That is, errors stemming from a failure to respond to natural cues would be differentiated from other sources. Table 3 contains the performance data of Scott on the skill, "obtains a loaf of bread" using a four-point system. These data indicate that Scott: initiated the response (he opened the cupboard in search of the bread); did not respond to the relevant natural cue (the relevant cue was the bread box, not the cupboard); performed the actions in a topographically acceptable manner (upon informing Scott of the correct location of the bread, he was able to perform the motions necessary to remove it from the box); and did not perform the actions in a qualitatively acceptable manner (he exerted so much pressure on the loaf that several of the pieces could not be placed in the toaster).

Procedure for Phase I

Phase I was conducted in five parts: Pretest in Actual Homes, Pretest in the DTS, Instruction, Post-test in the DTS, and Post-test in Actual Homes. Each of these five parts is presented in more detail below.

Part 1: Pretest in actual homes. One pretest session was conducted in the actual home of each student. Arrangements were made to visit each home and observe each student engaging in the four activities. Parents were asked to give the initial directions and provide assistance when necessary.

Table 3

An Example of a Four-Point Measurement System

Cue	Skill	Intiates	Responds to relevant natural cue(s)	Performs in Topographically Acceptable Manner	Performs in Qualitatively Acceptable Manner
A bread box located on the counter next to the sink	Obtains a loaf of bread	+	-	+	-

Directions for each activity were given in a room different from that in which the activity was to actually occur. For example, while sitting in the family room a student was told, "It's time to make your sack lunch so that you can bring it to school." The student was expected to initiate the activity by going to the kitchen to prepare the sack lunch. Since it was established that the student had no previous direct experience with this activity, a sample sack lunch was made available. Once in the kitchen, the parent emptied the contents of the sack lunch, labeled each item, and said, "Now, make your sack lunch."

For the second activity, putting away the silverware, a student was instructed, "The dishes have been washed and put away, but there are still some things left. Please, put them away." The presence of the utensils on the counter or in the dishwasher was considered a cue to put them away. For the third activity, folding and putting away socks and towels, a basket containing clean laundry was available. A student was told, "You have one more job to do. There are socks and towels that need to be folded." For the fourth activity, preparing toast, the student was instructed, "You've been working hard. I made a snack, you go and make one too." This was the cue to go to the kitchen where a plate with two slices of buttered toast was out on the table. An additional cue, "This is my toast. Why don't you make your own?" was then provided.

The teacher and an independent observer recorded information about the performance of each student. Response measures were secured in relation to the skills listed in the ecological inventories for each of the four activities. If a student made an error and did not self-correct, either the teacher or parent intervened, but only after information about the error was recorded. The appropriate action was then performed by the parent or the teacher so that the student could continue to progress through the activity and therefore allow performance measures in relation to subsequent responses.

Part 2: Pretest in the DTS. Two sessions were needed to conduct pretests in the DTS. Prior to the sessions, the students were taken to the DTS and allowed to become familiar with the surroundings. During the pretests, the teacher and an independent observer recorded information about the performances of each student as they engaged in the four activities. The directions provided were essentially the same as those described in Part 1. Again, response measures were secured for the skills listed in the ecological inventories for the four activities.

Part 3: Instruction. Systematic instruction was provided in the DTS on the four activities for one half day per week over three consecutive weeks. All instruction was provided in groups of two by the teacher or an occupational therapist. Parents agreed to wait until the end of the study before having their children engage in these activities at home.

The teaching procedures consisted of relatively common combinations of physical and verbal prompts and models (Falvey, Brown, Lyon, Baumgart, & Schroeder, 1980). The cues utilized during instruction were those available in the DTS (see the cues listed in Table 2 as an example) but

not necessarily those available in the actual homes. Each student was given the opportunity to perform every skill listed for four activities. An additional trial was provided if an error had been made on any of the previous trials. For example, if Scott failed to locate the bread in the bread box during the previous session, at the appropriate time in the skill sequence the teacher would intervene by modeling the correct response. She would physically assist Scott through that trial, and then immediately allow him to make the response again with less assistance.

Part 4: Post-test in the DTS. Following the three instructional sessions, two consecutive post-tests were conducted in the DTS. The procedures used to conduct these post-tests were the same as those used to conduct the pretests.

Part 5: Post-test in actual homes. The final part of Phase I consisted of arranging a second home visit so as to record performance on the four activities after training was completed at the DTS. The conditions under which these post-tests were conducted were the same as those arranged during the pretest sessions.

Data Collection and Interobserver Agreement

Data were gathered simultaneously by the teacher and the independent observer during pretest and post-test sessions. These measures were secured in each category using the four-point measurement system. In addition, anecdotal records related to each incorrect response were made. The percentage of interobserver agreement was computed by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. The mean percentages of agreement for each session ranged from 96.0% to 97.2% with an overall mean of 96.8%.

Experimental Design

An ABA (Test-Teach-Test) design using students as their own controls was used to evaluate the acquisition and transfer performance during Phase I.

Results

Phase I was conducted to determine the extent to which the response to relevant cues acquired in a DTS would be transferred to an actual home. Thus, performance in the DTS before and during instruction, and performance in actual homes after instruction were subjected to descriptive analyses. For organization and communication purposes, performances during instruction (acquisition) and during the post-tests in the actual homes (transfer of training) will be considered.

Acquisition

The total numbers of skills required to complete the four activities as they occurred in each actual home were 110 for Alice, 113 for

Bruce, and 109 for Scott.[1] For each of these skills, measures were secured in four response categories. The use of the four-point measurement system facilitated the isolation of incorrect responses due to a failure to respond to the natural cues. Since only the data from the natural cue category are needed to respond to the questions of this study, the presentation will be limited to this category. The number and percentage of responses performed incorrectly during the pretest in an actual home are depicted in Column A of Table 4. If a response was performed incorrectly on a pretest in an actual home, and then performed correctly on both post-tests in the DTS, acquisition in the DTS was said to have occurred. The number and percentage of responses meeting these acquisition criteria in the natural cue category are presented in Column B of Table 4.

As can be discerned by inspecting Column A of Table 4, Alice incorrectly performed 16 responses to natural cues during the pretest in her actual home. However, as can be discerned from inspecting Column B, she acquired 56% of the natural cue responses in the DTS. Bruce incorrectly performed 16 responses to natural cues during the pretest in his actual home (Column A). Of these responses, he acquired 88% of the natural cue responses in the DTS (Column B). Scott incorrectly performed 27 responses to natural cues during the pretest in his actual home (Column A). Of these responses, he acquired 74% of the natural cue responses in the DTS (Column B).

Transfer of Training

If a response was performed incorrectly on a pretest in an actual home, and then performed correctly on both post-tests in the DTS, as well as on the post-test in an actual home, transfer of training was said to have occurred. The number and percentage of responses meeting these transfer of training criteria in each natural cue response category are presented in Column C of Table 4.

As can be discerned by inspecting Column B of Table 4, Alice acquired 9 responses to natural cues in the DTS. Of these, 44% of the responses to natural cues transferred to her actual home. Bruce acquired 14 responses to natural cues in the DTS (Column B). Of these, 57% of the responses to natural cues transferred to his actual home (Column C). Finally, Scott acquired 20 responses to natural cues in the DTS (Column B). Of these, 95% of the natural cues transferred to his actual home (Column C).

Whereas many responses were acquired in the DTS and subsequently were transferred to the actual home, instructionally acceptable numbers were neither acquired nor transferred. That is, in almost every instance,

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[1] The totals differed slightly because of the unique performance requirements in each actual home. For example, it was necessary to remove the utensils from the dishwasher in Bruce's home, but no such performance requirement existed in Scott's home.

Table 4

Pretest, Acquisition and Transfer Measures in the Natural Cue Category

Student	Number of Skills to be Performed in the Actual Home	Number and Percentage of Responses Performed Incorrectly During the Pretest in an Actual Home	Number and Percentage of Responses Acquired in the DTS	Number and Percentage of Responses That Were Transferred to an Actual Home
Alice	110	16 (or 15%)	9 (or 56%)	4 (or 44%)
Bruce	113	16 (or 14%)	14 (or 88%)	8 (or 57%)
Scott	109	27 (or 25%)	20 (or 74%)	19 (or 95%)

an incorrect response to a natural cue prevented the student from progressing through or engaging in the activity independently. For example, Scott, who transferred the greatest percentage of responses, did not transfer the response to a natural cue when "putting a plate in the sink." Although he acquired the necessary responses in the DTS, he did not transfer this performance to post-testing conditions in his home. Instead of placing the plate in the sink at home, he put it in the garbage container as if it were a paper plate. Here, the lack of transfer of just one response prompted both his parents and his teachers to record his performance as less than acceptable.

Observations made by the teacher during the second home visit prompted her to hypothesize that the less than acceptable transfer of training was at least in part a function of the different stimuli available in the two environments. For example, in the DTS, Alice acquired the skill "puts toaster away." In the DTS it was necessary for her to push the toaster back to its original location against a wall. During the post-test in her actual home, she did not put the toaster away appropriately, probably because placing a terrycloth cover over the toaster was required. Here, the relevant cue, the terrycloth cover lying on the counter, was not available in the training environment. Phase II was designed to determine whether greater transfer of training would result if the cues available in the students' actual homes were incorporated into the DTS.

Phase II

Method

Those responses that were not acquired and therefore did not transfer in the natural cue response category during Phase I became the targets of instruction during Phase II. The question under study was:

> Will an instructional strategy which uses many of the specific cues available in actual homes result in greater transfer than an instructional strategy that uses the cues available only in a DTS?

Procedure for Phase II

Phase II was conducted in three parts: Instruction, post-test in the DTS, and Post-test in Actual Homes.

Part 1: Instruction. Systematic instruction was provided in the DTS on the four activities for one half day each week over three consecutive weeks. All instruction was provided in groups of two by the teacher and an occupational therapist. The students continued to be given opportunities to perform each skill listed for the four activities with an additional trial provided for those skills identified as the instructional targets of Phase II. The teaching procedures were essentially the same as those used in Phase I; i.e., combinations of physical and verbal prompts and models. However, two types of instructional strategies were used when arranging the cues to which a student would respond:

the original strategy, i.e., the strategy used in Phase I in which a student was taught to respond to only those cues available in the DTS; and a replicative strategy, i.e., a strategy in which a student was taught to respond to cues that more closely approximated those available in his or her actual home. For example, with the original strategy Scott was taught to obtain bread which was located in a bread box on the counter in the DTS. With the replicative strategy, he was taught to obtain bread which was located in the DTS refrigerator because that was where it was kept in his actual home.

In order to minimize the probability that exposure to one instructional strategy prior to the other might result in order affects, all students received both strategies during each instructional session. Thus, for two of the activities, the original strategy was used, and for the remaining two activities a replicative strategy was used. These assignments were counterbalanced in the manner depicted in Table 5. In addition, this table contains a list of the skills that were targeted under each strategy for each of the three students.

Alice received instruction on preparing toast and folding laundry using a replicative strategy. Under the replicative strategy the cues for the targeted skills were introduced or rearranged in the DTS to more closely approximate those available in Alice's home. For example, a cover was placed on the toaster and the bread was removed from the bread box and placed on top of the toaster to replicate the cues available in the kitchen at Alice's house. For the activities putting silverware away and making a sack lunch she continued to receive instruction using the original strategy. That is, she was taught to utilize the cues available in the DTS only. For example, she continued to place "other" utensils (spatula, can opener, etc.) in the silverware drawer because that was where they were located in the DTS. However, in her home, large utensils were located in a drawer other than that containing silverware.

Bruce received instruction on putting silverware away and making a sack lunch using a replicative strategy. Cues for the targeted skills were rearranged in the DTS, e.g., the clean silverware were placed in the dishwasher instead of the drainboard near the sink. For the activities preparing toast and folding laundry, he continued to receive instruction using the original strategy. For example, in the DTS, the towels were stacked in a linen closet by size. Consequently, to perform the skill "puts large towels away," Bruce was taught to respond to the cue of another large towel, even though in his house they were organized by colors and patterns.

Scott received instruction on putting silverware away and making a sack lunch using a replicative strategy. Cues for the targeted skills were introduced and rearranged in the DTS, e.g., large utensils were located in a drawer other than the silverware drawer to replicate the cues available in his home. For the activities preparing toast and folding laundry, he continued to receive instruction using the original strategy. For example, in the DTS, bread was kept in a bread box although

Table 5

The Assignment of Instructional Strategies With a Listing of the Targeted Skills for the "Natural Cue" Response Category

Activity:	Putting Silverware Away	Making a Sack Lunch	Preparing Toast	Folding Laundry	Total Number of Targets
Strategy:	Original		Replicative		
Targets: The skills that did not transfer during Phase I		1. Obtains plate 2. Obtains baggies 3. Obtains a lunch bag 4. Obtains a napkin	1. Puts toaster away		5
Targets: The skills that were not ac-	1. Puts "other" utensil in correct slot		1. Adjusts light/dark control	1. Separates socks and towels vs. other 2. Finds a matching sock 3. Puts large towels on appropriate stack 4. Puts medium towels on appropriate stack 5. Puts washcloth on appropriate stack	7
Strategy:	Replicative		Original		
Targets: The skills that did not transfer	1. Locates clean silverware	1. Obtains fruit 2. Obtains a lunch bag		1. Puts large towels on appropriate stack 2. Puts medium towels on appropriate stack 3. Puts washcloth on appropriate stack	6
Targets: The skills that were not acquired	1. Puts cake fork in correct slot		1. Adjusts light/dark control		2
Strategy:	Replicative		Original		
Targets: The skills that did not transfer		1. Puts plate in sink			1
Targets: The skills that	1. Puts teaspoon in correct slot 2. Puts "other utensil in		1. Obtains bread	1. Finds a matching sock 2. Puts large towels away on appropriate stack	

it differed from the cue available in his home. The bread was kept in the refrigerator at Scott's home.

Part 2: Post-test in the DTS. Following the three instructional sessions, two consecutive post-tests were conducted in the DTS. The procedures used to conduct these post-tests were the same as those used to conduct the pretests in Phase I.

Part 3: Post-test in actual homes. The final part of Phase II consisted of arranging a third home visit so as to record performance on the four activities. The conditions under which these post-tests were conducted were the same as those arranged during the pretest sessions.

Data Collection and Interobserver Agreement

Data were gathered simultaneously by the teacher and the independent observer during the post-test sessions in the DTS and in actual homes. Again, the measures of primary interest were those secured in the category "responds to relevant natural cue(s)." Using the formula described in Phase I, the mean percentages of interobserver agreement for each session ranged from 98.2% to 98.5%, with an overall mean of 98.3%.

Experimental Design

To compare the effects of the original and replicative strategies on the acquisition and transfer performances, the three students were exposed to both strategies during each instructional session. These strategies, and their assignments to each of the four domestic activities, were counterbalanced (see Table 5).

Results

Phase II was conducted to determine if greater transfer of training occurred as a result of the replicative strategy or the original strategy. The skills that were not acquired and did not transfer during Phase I in the natural cue response category were the targets of instruction during Phase II. Thus, the targeted responses to natural cues which transferred from the DTS to an actual home were subjected to descriptive analyses.

The total numbers of responses targeted were 12 for Alice, 8 for Bruce and 8 for Scott. These totals represent the number of responses to natural cues that either were not acquired or did not transfer during Phase I. For purposes of Phase II, if a targeted response was performed correctly on both post-tests in the DTS, and then performed correctly on the post-test in the actual home, transfer of training was said to have occurred. The numbers of responses that were performed correctly under the two teaching strategies for each student during Phase II are presented in Columns A and B of Table 6. As can be discerned by inspecting

Table 6

The Number and Percentage of Responses to Natural Cues That Were Transferred as a Function of Original and Replicative Teaching Strategies

		A	B	C	D
Student	Teaching Strategy	Number of Responses Targeted For Instruction	Number of Responses Performed Correctly on Post-tests in STS	Number of Responses That Were Transferred	Percentage of Responses That Were Transferred
Alice	Original	5	5	1	20%
	Replicative	7	7	7	100%
Bruce	Original	4	4	1	25%
	Replicative	4	4	4	100%
Brett	Original	3	3	0	0%
	Replicative	3	3	3	100%

Columns A and B in this table, each response targeted for Alice and Bruce was performed correctly on the post-test in the DTS.[2]

As can be discerned by inspecting Columns B and C of Table 6, of the 5 responses performed correctly under the original strategy in the DTS, Alice transferred 1 response to her actual home. Of the 7 responses taught and performed correctly under the replicative strategy in the DTS, all 7 were transferred to her actual home.

The responses performed correctly by Bruce under the original strategy in the DTS totalled 4 (Column B). Of these, he transferred 1 response to his actual home (Column C). The responses performed correctly under the replicative strategy in the DTS totalled 4 (Column B). Of these, all 4 were transferred to his actual home.

The responses performed correctly by Scott under the original strategy in the DTS totalled 3 (Column B). He did not transfer any of these responses to his actual home (Column C). The responses performed correctly under the replicative strategy in the DTS totalled 3 (Column B). Of these, all 3 responses were transferred to his actual home.

Finally, as can be discerned by inspecting Column D of Table 6, all three students transferred 100% of the targeted responses when the replicative strategy was used. When the original strategy was used, significantly smaller percentages, 20%, 25% and 0% of the targeted responses, were transferred to the actual homes of Alice, Bruce, and Scott, respectively.

Discussion

Phase I was designed to investigate the extent to which three severely handicapped students would transfer training provided in a DTS to their actual homes. Because of rather large interstudent variability, interpretations of the results secured must be viewed as tenuous. Nevertheless, at least the following observations seem in order:

After three instructional sessions, each student did in fact acquire responses to relevant cues not manifested during pretest conditions;

All students transferred some of the responses acquired in the nonschool DTS to their actual homes; and

While all transferred some responses, those transferred, at least by two students, were not of sufficient quantity or quality to meet reasonable criteria of functional utility in their actual homes.

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[2]The two responses that Scott did not perform correctly on the posttests in the DTS were: puts plate in sink; and finds a matching sock.

Plausible explanations as to why some responses transferred and others did not should be considered. One plausible explanation relates to the acquisition criterion which required correct performance on both post-tests in the DTS. Whereas, this criterion may have been adequate to consider some responses "acquired," a more stringent criterion may have been necessary to consider other responses "acquired." For example, after correct responding on two post-tests to the natural cues required to locate the bread in the DTS, the teacher may have been convinced that Alice had mastered the response. However, two correct performances on post-tests for responding to the natural cues required to put wash cloths on the appropriate stack in the linen closet may not have resulted in the same level of teacher confidence. Perhaps, more responses would have transferred during Phase I if students were afforded additional instructional time and if a more stringent acquisition criterion were used. Another plausible explanation is that greater skill transfer occurred because the cues available in the actual homes were similar to those available in the DTS. It is this latter explanation that led to the design of Phase II.

Phase II was designed to address the question of whether a replicative strategy, i.e., one that introduces the cues available in the actual home into the DTS, would produce greater generalization than the strategy used previously. The replicative strategy did, in fact, produce significantly greater skill transfer for all three students in the category of responding to natural cues. Again, because of sample size and other methodological considerations, interpretations of the results must be made cautiously. Nevertheless, inspection of the data clearly leads to the conclusion that the replicative strategy is the teaching strategy of choice in that it resulted in substantially more transfer of training from the DTS to actual homes than did the original teaching strategy. The superiority of the replicative strategy is consistent with previous research (Koegel & Rincover, 1974; Rincover & Koegel, 1975).

Collectively, the results of Phases I and II have implications for teachers of severely handicapped students. Since many of the responses acquired in the DTS did transfer to the students' actual homes, nonschool training approach such as the one used in this study remains a viable instructional option. However, as indicated by the data presented in Phase II, teaching in a nonschool environment does not completely ameliorate the transfer of training difficulties experienced by many students. When the training environment is not the environment in which the student will ultimately function, then other strategies must be used to promote greater skill transfer. The skills acquired under training conditions should be demonstrated and verified in the generalization environment of concern (in this case the students' actual homes). The skills that do not transfer should be subjected to detailed analysis so that teaching strategies such as the replicative strategy can be used.

Several techniques were used to ensure the social validity of the skills that were taught. Parent input was sought prior to the design of the study. Activity selection was based on the priorities expressed by the parents. Parents remained involved throughout the study by

participating in the post-test sessions conducted in their homes. Finally, a follow-up questionnaire was sent to the parents to secure information about the significance of the behavior change which actually occurred (Kazdin, 1977). Parents of all three students indicated that they noticed gains in performance by the end of the study. Bruce's parents indicated that the gains realized were "beyond expectations." They added, "Bruce now considers it his job to put away the silverware and gets upset if someone else does it." Furthermore, all parents wanted to see the program continued adding that they would like to have their children develop other skills such as those required to make a bed and do the dishes.

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