

205

ACQUISITION OF HORTICULTURAL WORK SKILLS
BY MENTALLY RETARDED ADULTS USING SOCIAL REINFORCEMENT

by
SHERYL L. KRELL

B.S., Iowa State University, 1980

A MASTER'S THESIS

submitted in partial fulfillment of the
requirements for the degree
MASTER OF SCIENCE

Department of Horticulture
KANSAS STATE UNIVERSITY
Manhattan, Kansas

1983

Approved by:

Richard H. Mattson
Major Professor

**THIS BOOK
CONTAINS
NUMEROUS PAGES
WITH THE ORIGINAL
PRINTING BEING
SKEWED
DIFFERENTLY FROM
THE TOP OF THE
PAGE TO THE
BOTTOM.**

**THIS IS AS RECEIVED
FROM THE
CUSTOMER.**

LD
2668
.T4
1983
K73
c.2

A11202 580308

TABLE OF CONTENTS

ACKNOWLEDGMENTS	i
INTRODUCTION	ii
LITERATURE REVIEW	1
METHOD	4
Subjects	4
Design.....	4
Materials.....	6
Trainer.....	6
Procedure.....	7
RESULTS AND DISCUSSION	9
Number of Trials.....	9
Error Scores.....	10
Time.....	12
Conclusion.....	13
TABLE 1	5
TABLE 2	14
TABLE 3	15
TABLE 4	16
TABLE 5	17
LITERATURE CITED	18
APPENDIXES	
APPENDIX A	20
Horticultural Skills Task Analysis Forms	
APPENDIX B	23
Informed Consent Form	
APPENDIX C	25
Horticultural Evaluation Test	

ACKNOWLEDGEMENTS

The author would like to thank Dr. Richard Mattson, Professor of Horticulture, Dr. James Greig, Professor of Horticulture, and Dr. Fred Bradley, Professor in Administration and Foundations for their assistance in conducting this study.

Appreciation is also extended to the staff and clients of Big Lakes Industries, Manhattan, Kansas for their willing participation.

A special thanks goes to the author's parents for their continual support and encouragement.

INTRODUCTION

In 1979, it was estimated that of 11 million potentially employable disabled adults in the United States, only one-third were working; and of those, many were not employed in positions utilizing their full capacity (Acton, 1981). Horticultural therapists are being trained to enhance vocational skills of the mentally retarded. To reach full work potential through horticulture, continued development and implementation of horticultural training methods is needed.

Task analysis is the generally accepted method used in training for horticultural work skills (Copus, 1980). A major component of task analysis is the social reinforcement given to the trainee via the trainer. The relationship between the two participants thus becomes important to the training process. Bellamy (1979) points out that social interaction with a trainer, if associated with an error, can become an inappropriate reinforcer. The task should provide the strong reinforcing properties for the worker (Gold, 1973).

This study investigated the acquisition of horticultural work skills by trainable mentally retarded adults involved in pre-vocational horticultural training using social reinforcement.

The results of this study were prepared for publication in American Journal of Mental Deficiency.

ACQUISITION OF HORTICULTURAL WORK SKILLS
BY MENTALLY RETARDED ADULTS USING SOCIAL REINFORCEMENT

Sheryl L. Krell

Kansas State University

Horticulture offers a variety of benefits and opportunities to those involved. For the mentally retarded, multi-phased horticultural therapy programs have been developed to provide them access to these benefits. Therapeutic programs work to improve mental and physical well being, while educational programs expand vocabulary, communication and observation skills (Hefley, 1973). Vocational programs attempt to equip the mentally retarded with horticultural work skills, maximizing their work potential and ideally leading to employment (Copus, 1980).

In our society, mentally retarded are generally looked upon as individuals who have a low potential for learning new skills, or working productively (Bellamy, Horner, & Inman, 1979). Zider (1981) wrote that these perceived difficulties in training moderately, severely, and profoundly retarded individuals produce severe skill deficits. Zider further stated that the limits lie with the extent of resources and quality of techniques for teaching, not the disabilities given to an IQ level or classification. To overcome these limitations, effective training methods must be developed.

Task analysis is the widely used method for training handicapped individuals for specific skills. Horticultural programs have adapted task analysis for vocational horticultural training. Morris (1978) studied the use of task analysis in training mentally retarded adults for seven vocational work skills. Skills ranged from watering, to mixing soil, to transplanting. After 10 weeks, clients were gaining rapid progress in independent

performance. A horticulture program at the Clinton County Chapter of the New York State Association for Retarded Citizens also uses task analysis and finds it very effective, especially on a one-to-one trainer-trainee ratio.

Melwood Training Center for mentally retarded adults, trains individuals for vocational technical job skills involving horticulture. Task analysis is again the general training system utilized. Staff find it effective in that it allows a task to be adequately broken down into components to meet the trainee's needs, and can be designed to record the trainee's progress (Copus, 1980).

Gold (1976) identified three components of task analysis: 1) method--the way the task is to be performed, 2) content--the steps required for the method to be carried out, and 3) process--the way the task is taught. The process is further divided into three sub-components, one of which is feedback.

Feedback is the verbal or non-verbal instruction/consequence received by the learner during training. Feedback informs the learner of what is expected and if he/she is reaching those expectations.

A form of feedback is reinforcement which includes the events that occur following a behavior to increase the likelihood the behavior will be repeated under the same conditions. Reinforcements may be artificial or natural. Artificial reinforcements are not found in the natural environment, while natural reinforcements are found even in the absence of the trainer (Gold, 1980). Because of the interconnected relationship between trainer, trainee, and task; reinforcements play a vital role in the learning process. Trainers often overestimate the power of artificial reinforcement, necessitating the need for reinforcement sampling prior to training (Adams, 1981).

Most research has focused on the value of tangible reinforcers for performing simple, repetitive tasks such as--stuffing envelopes (Brown,

Johnson, Gadberry, & Fendrick, 1971), pulling knobs (Siegl, Forman, & Williams, 1967; Evans & Spradlin, 1966) or putting nails in holes (Gordon, O'Connor, & Tizard, 1955). Other studies examined social reinforcers (e.g., verbal praise) and similar tasks with mentally retarded children (Zigler & Balla, 1972; Zigler, 1963; Stevenson, 1961). More recently, discussions and observations on the use of reinforcements--specifically social reinforcers--while training mentally retarded adults for complex vocational skills has evolved.

Gold (1973) successfully trained moderately and severely retarded adults to assemble a complex bicycle brake. In his Try Another Way Training Manual, Gold's (1980) rules for training include: 1) the best reinforcers are natural, let the task provide motivation, 2) find ways to provide feedback without the trainee having to stop attending to task, and 3) allow for self-correction.

Those involved in horticultural vocational skill training with the mentally retarded have adapted similar criteria. Trainers at the Clinton County ARC Chapter horticultural program use minimal eye contact and simple gestures when prompting trainees (Copus, 1980). They find this more effective than verbal instructions or corrections. Melwood Horticultural Training Center staff also utilizes these methods in their vocational program (Copus, 1980).

If horticulture is to provide potential employment for the mentally retarded, vocational training techniques must be devised that allow for maximum and efficient skill acquisition. This study used task analysis to examine acquisition of horticultural work skills by mentally retarded adults with or without social reinforcements present.

METHOD

Subjects

Eight trainable, mentally retarded adults (4 male, 4 female) from a work training center were randomly selected as subjects. Their mean length of involvement with the center was 3.5 years and their ages ranged from 22 to 63 years (\bar{X} = 39 years). Intelligence scores, based on the Wechsler Intelligence Scale for Children, ranged from 42 to 63 with \bar{X} = 52. Subjects selected did not appear to have physical or behavioral limitations that interfered with their performance. Informed consent forms were read to and approved by clients and parents/guardians.

Four of the subjects (2 male, 2 female) were involved in the work center's prevocational horticultural training program at the time of the study. The mean IQ score for this group was 51 with age \bar{X} = 40 years. Another 2 male and 2 female subjects selected were not involved in the prevocational horticultural training program. In this group, the IQ score \bar{X} = 53, and the age \bar{X} = 39 years.

A horticultural evaluation test (H.E.T.) designed to measure an adult's horticultural language and work skills was administered to each subject prior to training. Out of a possible 130 points, the mean scores were 104.8 and 92.3 for the subjects involved in the horticultural program and those not involved, respectively (See Table 1).

Design

Acquisition of horticultural work skills was compared using two reinforcement conditions.

Table 1

Means and standard deviations (SDs) for horticultural
evaluation test scores (based on 2 subjects/mean)

Group	<u>Identification^y</u>		<u>Work Skills^z</u>	
	Mean	SD	Mean	SD
Greenhouse				
Reinforcement	50.0	24.0	40.5	3.5
Non-reinforcement	75.5	0.7	44.5	0.7
Workshop				
Reinforcement	56.0	4.2	43.5	2.1
Non-reinforcement	42.5	4.9	39.5	0.7

^yMaximum score for Identification = 85.

^zMaximum score for Work Skills = 45.

1) The control group was comprised of 4 subjects who did not receive social reinforcement. One male and 1 female horticultural trainee and 1 male and 1 female workshop trainee were randomly assigned to this group.

2) The treatment group also contained 4 subjects, who received social reinforcement and were selected in the same manner as the control group.

Materials

The horticultural work skills studied were vegetative propagation and seeding bean seeds. Both skills required learning 10 separate steps as shown in Appendix A.

Vegetative propagation used: 8 cm square, plastic green pots, a soil mixture (soil, peat perlite), a standard flat and watering can. Cuttings approximately 10 cm long taken from Swedish ivy stock plants were placed in soil filled pots, one cutting per pot. These were then placed in a flat and watered.

Seeding used: 10 x 20 cm plastic market packs, a soil mixture, a standard flat, and snapbean seed. Approximately 8 seeds were evenly distributed along 2 rows formed in the soil filled pack. The seeds were then covered with soil and placed in the flat.

For both skills, materials were placed on a work table in the order they were to be used identified by the task analysis steps (See Appendix A).

Trainer

The trainer was a senior, horticultural therapy intern. Pre-experimental practice runs were conducted using other non-treatment subjects from the work center. During these pre-experimental practices, the researcher and trainer discussed the correct procedures to use and how to deal with any problems that might arise. Training sessions were scored and timed by a single observer.

Procedure

The following procedures were applied in the training for vegetative propagation and seeding skills:

1) Prior to training, a criterion level of 80% (8 correct trials out of 10 consecutive trials) was established as the point of skill acquisition. This level was based on previously reported practice runs and recommendations (Copus, 1980).

2) Subjects were trained individually. Sessions were held twice a week for 25 minutes or until criterion was reached. All subjects completed vegetative propagation skill training before beginning seeding skill training.

3) Three demonstration runs were performed by the trainer before each subject's first trial. The trainer started out by saying, "Watch me as I do the task three times, then you can try." She then did the task correctly as the trainee watched. The subject was then told to try it.

4) Following an error by the subject, both the control and treatment groups were corrected with a general verbal cue such as, "Try it again." If the subject still did not correct the error, the trainer went back one step and modeled the correct procedure. Again, the trainee was instructed to "Try it again." At this point subjects in the control group who correctly completed the step received no reinforcement of any kind from the trainer. Subjects in the treatment group who correctly completed the step received a "Good" and a pat on the back.

5) If a step was not corrected following the verbal cue or modeling, the trial was terminated and a new trial begun at step one. This was true for both control and treatment groups.

6) Acquisition of the vegetative propagation and seeding work skills under the two reinforcement conditions was evaluated using: (a) the number

of trials required to reach the criterion level, and (b) the number of errors committed per trial (score). Scoring for the number of errors was based on the following 3 point scale:

- 1 = step completed without error
- 2 = step completed with correction
- 3 = step not completed

7) Analysis of variance was completed for the independent variables: group (workshop vs. greenhouse), training method (reinforcement vs. non-reinforcement), and sex. Also analyzed were the interaction effects of group x training method and sex x training method.

8) The time (seconds) required to complete each trial for the seeding skill training was recorded. If a step was not completed and a trial terminated, 25 seconds was added to the total trial time for each uncompleted step. The approximate normal rate for completing a trial is 10 seconds.

RESULTS AND DISCUSSION

Number of Trials

Horticultural skills. The eight developmentally disabled adult subjects in this study, required a similar number of trials to reach criterion for vegetative propagation ($\bar{X} = 10.6$) and seeding ($\bar{X} = 10.3$) horticultural skills, as shown in Table 2. During vegetative propagation training, 2 subjects required more than 10 trials. Only 1 subject required more than 10 trials for seeding training. Similar responses suggest the horticultural work skills were fairly easy for the subjects to learn. However, difficulty with individual steps of the horticultural skills is not reflected in the number of trials required, since trials with many errors were recorded as completed if the errors were corrected. Most subjects, regardless of their previous horticultural or training method experience, corrected errors following a verbal cue or modeling. This is consistent with the findings of a study by Shoemaker (1982) on modeling as a prevocational horticultural training method for mentally retarded adults.

Group experience. Greenhouse and workshop subjects required a similar number of trials to acquire horticultural skills. This was anticipated, as the H.E.T. scores showed similar identification and work skill abilities between the two groups (Table 1). Similar responses may have occurred between groups because the tasks were easy and the work skills acquired quickly. Secondly, the task may have included new work skills for both groups, thus the greenhouse subject's previous experience was minimized.

Training method. The developmentally disabled subjects required a statistically similar number of trials to reach criterion for both social

reinforcement and non-reinforcement training methods. The reinforced subjects required a mean of 10.0 trials for vegetative propagation and 10.5 for seeding, while non-reinforced subjects required a mean of 11.2 and 10.0 trials for vegetative propagation and seeding, respectively. The similar number of trials required indicates subjects under both training methods were able to correct their errors. While these results seem to imply errors occurred because of the task steps level of difficulty, and were corrected as a direct result of the modeling, it does not necessarily mean the training methods were not a factor. For subjects to get reinforcement, a mistake must be made and corrected. Some subjects may have been making and correcting errors to get reinforcement, or as in the case of the non-reinforced subjects, in an attempt to get reinforcement. The number of trials results also do not indicate whether the training method affected the number of times an error was repeated.

Error Scores

Groups and horticultural skills. As presented in Table 3, greenhouse and workshop subject groups had a statistically similar number of errors per trial ($p > .05$) for vegetative propagation and seeding work skills. The same explanations for the similarity in the number of trials for the workshop and greenhouse groups, also applies for the similar number of errors committed per trial. The number of errors reflects the difficulty subjects had with the steps of the horticultural skills. Training subjects for more complex skills, might reveal a greater difference in performance between greenhouse and workshop subjects.

Training method. The training method used did significantly affect the number of errors committed by the subjects during vegetative propagation

skill training, but not during seeding skill training. Subjects receiving social reinforcement during vegetative propagation made fewer errors than subjects who received no reinforcement ($p < .05$). Social reinforcement and non-reinforcement subject groups for the seeding skill, committed a similar number of errors ($p > .05$).

Gold in 1973, recommended that a task be allowed to provide reinforcement during training. This should then cause non-reinforced subjects to commit equal or fewer errors per trial compared to socially reinforced subjects. The vegetative propagation result of fewer errors for social reinforcement subjects, does not support this hypothesis. It does support the frequent use of social reinforcement in prevocational work settings for the mentally retarded as stated by Brolin (1976).

Subjects in this study receive social reinforcement in their greenhouse and workshop normal work environments. The withdrawal of reinforcement may have caused the non-reinforced subjects to make mistakes in an attempt to get the trainer's attention. Over time, under the same training method, the non-reinforced subject's number of errors might decrease when they realize no social reinforcement can be expected. Since seeding skill training followed vegetative propagation training, this may explain why the number of errors during seeding training was similar under both training methods.

Training method x group interaction. As presented in Table 3, a Scheffe' multiple means comparison test indicated no significant difference in the number of errors committed among training method x group interactions for vegetative propagation skill training ($p > .05$). A significant increase in errors per trial was found for greenhouse subjects receiving social reinforcement than for other subject groups during seeding skill training.

A factor influencing these results was the small, 2 subject group size. One subject in the greenhouse, socially reinforced group consistently had problems with step 3 of the seeding task. This subject continually did not tap the pack on the table before proceeding to step 4, causing a comparatively high group error score. Whether the subject made the errors to get reinforcement from the trainer, or because tapping the pack was inconsistent with techniques the subject had previously been taught is not known.

Seeding skill training results also showed a somewhat higher number of errors for workshop non-reinforced subjects than for workshop reinforced subjects. Perhaps, a gradual fading of reinforcement rather than a complete withdrawal would be more effective in reducing the number of errors.

Time

Training method x groups. As presented in Table 4, the greenhouse non-reinforced subjects and workshop reinforced subjects required significantly less time per trial than greenhouse reinforced and workshop non-reinforced subject groups ($p < .05$). These results agree with error data since the time required to complete a task increases when a step is repeated due to repeated mistakes.

Sex differences. As shown in Table 5, male subjects took significantly less time to complete a trial than female subjects ($p < .05$). Since the time required increases with an increase in errors, male subjects should have committed fewer errors per trial than female subjects. Instead, similar numbers of errors occurred for both sexes. During training some males aware that they were being timed, appeared to be racing the clock. This may account for the discrepancy. The males may have responded to being timed

as a result of both the trainer and data recorder being female. Males are "normally" neither faster nor more accurate in horticultural work than females as evidenced by the large number of women hired by the horticultural industry to do transplanting and propagation.

Conclusion

This study suggests that social reinforcement may be effective initially during horticultural work skill training in improving performance of trainable developmentally disabled adults. The effectiveness of social reinforcement may also vary with a skill's level of difficulty, or a trainee's previous exposure to reinforcers. The positive reinforcing properties inherent in a task may also reduce the effectiveness of conventional reinforcement systems. Horticultural tasks involve a unique, living media which appears to provide reinforcement. Error scores and time significantly decreased for non-reinforced greenhouse and socially reinforced workshop trainees during seeding training.

The number of trials a trainee requires to reach an established criterion level is not necessarily a reflection of the difficulty or ease with which a trainee acquires a skill. An analysis of the errors committed per trial for vegetative propagation and seeding training revealed variations in how trainees acquired skills. Vocational training in horticulture, incorporating effective training techniques, can expand the mentally retarded adult's employable work skills.

Horticultural therapists should be aware that horticulture can be as effective of a reinforcement as social reinforcement, once skills are learned or the trainee adjusts to the non-reinforced training system. Through non-reinforcement methods, developmentally disabled clients may commit fewer errors when eventually employed.

Table 2
Number of trials required to reach criterion for vegetative
propagation and seeding skill training

Horticultural Skill	Group	Training Method		Mean
		Social Reinforcement	Non- reinforcement	
Vegetative Propagation	Workshop	10.0 a ^x	11.0 a	10.5 a ^y
	Greenhouse	10.0 a	11.5 a	10.7 a
	Mean	10.0 a ^z	11.2 a	
Seeding	Workshop	10.0 a ^x	10.0 a	10.0 a ^y
	Greenhouse	11.0 a	10.0 a	10.5 a
	Mean	10.5 a ^z	10.0 a	

^xMeans for groups x training method followed by the same letter are not significantly different from one another ($p \leq .05$)

^yGroup means in column or ^ztraining method means in row followed by the same letter are not significantly different from one another ($p \leq .05$)

Note. Perfect = 10.

Table 3
Error scores of training method and groups for vegetative
propagation and seeding skill training

Horticultural Skill	Group	Training Method		Mean
		Social Reinforcement	Non- reinforcement	
Vegetative Propagation	Workshop	10.6 a ^x	13.1 a	12.0 a ^y
	Greenhouse	11.3 a	12.9 a	12.1 a
	Mean	10.9 b ^z	13.0 a	
Seeding	Workshop	10.3 b ^x	12.6 ab	11.4 a ^y
	Greenhouse	14.2 a	10.9 b	12.4 a
	Mean	12.2 a ^z	11.7 a	

^xMeans for groups x training method followed by the same letter are not significantly different from one another ($p \leq .05$)

^yGroup means in column or ^ztraining method means in row followed by the same letter are not significantly different from one another ($p \leq .05$)

Note. Perfect score = 10. Increase in score indicates an increase in errors.

Table 4
Time (seconds per trial) required for training method
and group for seeding skill training

Group	Training Method		Mean
	Social Reinforcement	Non-reinforcement	
Workshop	98.7 b ^x	167.1 a	132.9 a ^y
Greenhouse	194.3 a	91.9 b	143.1 a
Mean	146.5 a ^z	129.5 a	

^xMeans for group x training method followed by the same letter are not significantly different from one another ($p \leq .05$)

^yGroup means in column or ^ztraining method means in row followed by the same letter are not significantly different from one another ($p \leq .05$)

Table 5
Time (seconds per trial) required for training method
and sex for seeding skill training

Sex	Training Method		Mean
	Social Reinforcement	Non-reinforcement	
Male	134.3 a ^x	110.3 a	122.3 b ^y
Female	158.8 a	148.7 a	153.7 a
Mean	146.5 a ^z	129.5 a	

^xMeans for training method x sex followed by the same letter are not significantly different from one another ($p \leq .05$)

^ySex means in column or ^ztraining method means in row followed by the same letter are not significantly different from one another ($p \leq .05$)

LITERATURE CITED

- Acton, N. Employment of disabled persons: where are we going? International Labour Review, 1981, 120, 1-14.
- Adams, G. L. The importance of reinforcer sampling before initiating skill training. Journal for Special Educators, 1981, 17, 189-198.
- Bellamy, T., Horner R. H., & Inman D. P. Vocational Habilitation of Severely Retarded Adults. Baltimore: University Park Press, 1979.
- Brolin, D. E. Vocational Preparation of Retarded Citizens. Columbus, OH: Merrill, 1976.
- Brown, L., Johnson, S., Gadberry, E., & Fenrick, N. Increasing individual and assembly line production rates of retarded students. The Training School Bulletin, 1971, 67, 206-212.
- Copus, E. The Melwood Manual. Upper Marlboro, MD: Melwood Horticultural Training Center, 1980.
- Evans, G. W., & Spradlin, J. E. Incentives and instructions as controlling variables of productivity. American Journal of Mental Deficiency, 1966, 71, 129-132.
- Gold, M. W. Factors affecting production by the retarded: base rate. Mental Retardation, 1973, 11, 41-45.
- Gold, M. W. Task analysis of a complex assembly task by the retarded blind. Exceptional Children, 1976, 43, 78-84.
- Gold, M. W. Try Another Way Training Manual. Champaign, IL: Research Press, 1980.
- Gordon, S., O'Connor, N., & Tizard, J. Some effects of incentives on the performance of imbeciles on a repetitive task. American Journal of Mental Deficiency, 1955, 60, 371-377.
- Hefley, P. Horticulture: a therapeutic tool. Journal of Rehabilitation, 1973, 39, 27-29.
- Morris, J. "A vocationally oriented horticulture skill training program for the mentally retarded adult using task analysis." Paper presented at the 6th meeting of the National Council of Therapy and Rehabilitation through Horticulture Annual Conference, Topeka, KS, 17-20 September 1978.
- Shoemaker, C. A. Modeling as a prevocational horticultural training method with trainable mentally retarded adults. M.S. Thesis, Kansas State University, Manhattan, KS, 1982.

- Siegl, P. S., Forman, G. E., & Williams, J. An exploratory study of incentive motivation in the retardate. American Journal of Mental Deficiency, 1967, 71, 977-983.
- Stevenson, H. W. The effectiveness of social reinforcement with normal and feeble-minded children. Journal of Personality, 1961, 29, 124-135.
- Zider, S. J., & Gold, M. W. Behind the wheel training for individuals labeled moderately retarded. Exceptional Children, 1981, 47, 632-639.
- Zigler, E. Rigidity and social reinforcement effects in the performance of institutionalized and non-institutionalized normal and retarded children. Journal of Personality, 1963, 31, 258-269.
- Zigler, E., & Balla, D. Developmental course of responsiveness to social reinforcement in normal children and institutionalized retarded children. Developmental Psychology, 1972, 6, 66-73.

APPENDIX A

HORTICULTURAL SKILLS TASK ANALYSIS FORMS

TASK	Propagation		CODE	1 = STEP COMPLETED WITHOUT ERROR	2 = STEP COMPLETED WITH CORRECTION
	GROUP 1	GROUP 2			
TRAINEE	SHEET #				

[illegible]

APPENDIX B

INFORMED CONSENT FORM

Informed Consent Statement

You have been asked to be a subject in a research project. The research is being done at Kansas State University. This research will help us understand how well people can learn to take care of plants.

You don't have to be in this research if you do not want to. If you don't want to do it, that is O.K. You will not be punished in any way.

After the research starts, you can still leave if you want to. I hope you will stay the whole time, but if you want to leave, that is O.K. You will not be punished in any way.

The research is not dangerous, and you should not be hurt at all. In fact, most people have fun and learn new things about plants.

Here is what you will do. You will learn how to plant seeds and how to put plants in pots. There will be a teacher to help you. The research will take about a 1/2 hour each day for 5 days.

If you help us with this research, I do not have money or anything else I can give you. However, I will be very grateful for your help.

In research, some people do very well, and others have trouble. I do not want anyone to be embarrassed or feel bad. So, I promise not to tell anyone how well you do.

Do you have any questions?

If you want to be in this research, please sign below:

Subjects: I have been told about this research, and I understand what will happen. I want to be in it.

Signature _____ Date _____

Parent or Guardian: I have read the orientation statement above and have been fully advised of the methods to be used on my child in this study. I understand the potential risks, as described, and hereby assume them voluntarily on behalf of my child.

Signature _____ Date _____

Please turn in one copy and keep the other for your records

APPENDIX C
HORTICULTURAL EVALUATION TEST

PART ONE: IDENTIFYING GREENHOUSE SUPPLIES AND PLANT PARTS

The following are the items to be identified:

- Flat
- Clay pot
- Plastic pot
- Perlite
- Soil
- Peat moss
- Watering can
- Trowel
- Clippers
- Plastic labels
- Hose
- Hose nozzle
- Roots
- Stem
- Leaves
- Flower
- Seeds

Each item will be placed in front of the subject. The subject will be asked, "What is this called?." After the subject responds or after 1 minute, the item will be removed and the next item placed in front of the subject. This is repeated for all items listed above.

PART TWO: WORK SKILL TASKS

All items for each task will be placed in front of the subject. The items are pointed to as instructions are given to the subject. Following instructions, the subject will be allowed 2 minutes to start the task. Instructions will be repeated up to 3 times if the subject so requests.

Following is a list of all work skill tasks to be tested, the materials needed for each task and the instructions for each task.

Task 1: Writing

Materials: label, pencil, printed label or something to copy

Instructions: In front of you is a pencil and label. Use the pencil to copy this word onto the label.

Task 2: Counting

Materials: a stack of pots (more than 10)

Instructions: In front of you is a stack of pots. Count out 10 pots from the stack.

Task 3: Mixing Soil

Materials: equal amounts of soil, perlite and peat moss in separate piles

Instructions: There are 3 piles in front of you. Mix the 3 piles together.

Task 4: Filling a Pot

Materials: planting media and a pot

Instructions: In front of you is a pot and planting media. Fill the pot full with the planting media.

Task 5: Pressing Soil

Materials: dibble stick (tool), pot filled with planting media

Instructions: (Model task as instructions are given) This part of the tool must go in the center of the pot, then press the tool down.

Task 6: Taking a Cutting

Materials: clippers, vine that is marked

Instructions: In front of you are clippers. Use the clippers to cut the plant on the mark.

Task 7: Sticking a Cutting

Materials: a cutting, a pot with a hole poked in the planting media

Instructions: In front of you is a cutting and a filled pot. Place the bottom end (point to the bottom end) of the cutting in the hole in the filled pot.

Task 8: Watering (2 steps)

Materials: water in a watering can, measuring cup with different color lines as measurement marks, potted plant

Instructions: Step 1--In front of you is a watering can, measuring cup and plant. There is water in here. Pour water to the red line in the measuring cup.

Step 2--Pour the water from the measuring cup in to the pot.

IDENTIFICATION SCORE SHEET--H.E.T.

DATE _____ EVALUATOR _____ SUBJECT _____ RATING SCALE _____ CORRECT = TALLY MARK
 INCORRECT = NO TALLY MARK/
 RECORD RESPONSE

IDENTIFYING GREENHOUSE SUPPLIES	TIME	TALLY/RESPONSE
FLAT		
CLAY POT		
PLASTIC POT		
PERLITE		
SOIL		
PEAT MOSS		
WATERING CAN		
TROWEL		
CLIPPERS		
PLASTIC LABELS		
HOSE		
HOSE NOZZLE		
TOTAL --GREENHOUSE SUPPLIES		
IDENTIFYING PLANT PARTS		
ROOTS		
STEM		
LEAF		
FLOWER		
SEED		
TOTAL --PLANT PARTS		
TOTAL --BOTH		

TASK SCORE SHEET--H.E.T.

DATE _____ EVALUATOR _____ SUBJECT _____ RATING SCALE 1 = FAIL

2 = ATTEMPT

3 = PASS

TASK	TIME	SCORE	COMMENTS
WRITING			
COUNTING			
MIXING SOIL			
FILLING A POT			
PRESSING SOIL			
TAKING A CUTTING			
STICKING A CUTTING			
WATERING			
STEP 1			
STEP 2			
TOTAL SCORE			

ACQUISITION OF HORTICULTURAL WORK SKILLS
BY MENTALLY RETARDED ADULTS USING SOCIAL REINFORCEMENT

by

SHERYL L. KRELL

B.S., Iowa State University, 1980

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the
requirements for the degree
MASTER OF SCIENCE

Department of Horticulture
KANSAS STATE UNIVERSITY
Manhattan, Kansas

1983

The acquisition of horticultural work skills by eight trainable, mentally retarded adults was studied using social reinforcement and non-reinforcement training conditions. Adult subjects were randomly selected from a work training center to complete vegetative propagation and seeding skill training. Skill acquisition was evaluated based on: (1) the number of trials required to reach criterion, (2) the number of errors committed per trial, and (3) the time required per trial for seeding skill training. Analysis of variance compared equal number of subjects assigned to training methods (social reinforcement vs. non-reinforcement), group background (prior greenhouse vs. no greenhouse training), sexes, and first order interactions.

Greenhouse and workshop trainees required a similar number of trials to reach criterion under both reinforcement conditions. Subjects receiving social reinforcement during vegetative propagation training made fewer errors than non-reinforced subjects. During seeding skill training, socially reinforced and non-reinforced subjects committed a similar number of errors. No significant difference in number of errors committed was found among training method x group interactions for vegetative propagation skill training, while significantly more errors were made by greenhouse subjects receiving social reinforcement than other subject groups during seeding skill training. Greenhouse non-reinforced and workshop reinforced subject groups required significantly less time per trial than greenhouse reinforced and workshop non-reinforced subject groups.

The results of this study suggest that social reinforcement may be initially effective during horticultural work skill training in improving performance of trainable, mentally retarded adults. The effectiveness may vary with a skill's level of difficulty or a trainee's previous exposure to reinforcers.