DOCUMENT RESUME

ED 450 512	EC 308 269
AUTHOR	Rowland, Charity; Schweigert, Philip
TITLE	Creating Classroom Environments That Nurture Independence for Children Who Are Deafblind. Final Report.
INSTITUTION	Oregon Health Sciences Univ., Portland. Child Development and Rehabilitation Center.
SPONS AGENCY	Special Education Programs (ED/OSERS), Washington, DC.
PUB DATE	2000-12-31
NOTE	53p.; Corrected version.
CONTRACT	H025D60013
AVAILABLE FROM	Oregon Health Sciences University, Oregon Institute on Disability & Development, Center on Self-Determination, 3608 S.E. Powell Blvd., Portland, OR 97202; Tel: 503-232-9154 ext. 115.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Child Development; *Classroom Environment; *Cognitive Development; *Communication Skills; *Deaf Blind; *Early Intervention; Multiple Disabilities; Outcomes of Treatment; Personal Autonomy; Physical Disabilities; Preschool Education; Severe Disabilities; Student Evaluation; *Teaching Models
IDENTIFIERS	*Oregon (Portland)

ABSTRACT

This final report describes activities and accomplishments of a 4-year federally supported project to develop independence in 12 young children (ages 3-5) with deaf-blindness enrolled in the Portland (Oregon) Public Schools Early Intervention Program. The project focused on helping teachers learn to target communicative and cognitive learning opportunities across the entire spectrum of everyday classroom activities and thus increase students' independent behavior. The project model involved assessment of both child skills and the social and physical environment, intervention by embedding instruction into routine activities using logically occurring antecedents and consequences, and a targeted outcome of child mastery of the social and physical environments as evidenced by interactions with people and objects. Evaluation indicated successful integration of communication and cognitive skills instruction into classroom activities and increased independence for most of the children. However, the intervention did not succeed in teaching skills that involved manipulation of the physical environment to children with severe orthopedic impairment in addition to their vision and hearing impairments. The project produced an inventory and manual to help teachers identify natural cues for certain behaviors and arrange the social and physical environment to facilitate learning. (Contains 12 references.) (DB)

OREGON INSTITUTE ON DISABILITY & DEVELOPMENT
of the Child Development and Rehabilitation Center

CORRECTED VERSION

Creating Classroom Environments that Nurture Independence for Children who are Deafblind

Final Report
(10-1-96 through 9-30-00)
Grant #H025D60013

Enhancing Human Ability

Creating Classroom Environments that Nurture Independence for Children who are Deafblind

Final Report
(10-1-96 through 9-30-00)
Grant #H025D60013

Charity Rowland, Ph.D.
Philip Schweigert, M.Ed.

December 31, 2000

Oregon Health Sciences University
Oregon Institute on Disability & Development
Center on Self-Determination
3608 S.E. Powell Blvd.
Portland, OR 97202
503-232-9154 ext. 115

Table of Contents

I. Project Summary 1

II. Project Objectives 3

III. Participants, Model and Methods 6
Participants 6
Methods 7
The Model 8

IV. Research Results 13
Skill Development by Individual Participants 14
Quality of Classroom Activities 19
Classroom-Wide Measures 20
Discussion of Results from Years 2 and 3 22
Year 4 Results 23

V. Project Impact 25
Permanent Products 25
Presentations 25
Publications 29

VI. Conclusions 30

VII. Assurance Statement 34

References Cited 35

Attachments
Communication Matrix
School Inventory of Problem Solving Skills
Time to Learn (includes Time to Learn Inventory)

Creating Classroom Environments that Nurture Independence for Children with Deaf-Blindness

I. Project Summary

The focus of this project was the development of independence in children with deaf-blindness. Independence is integral to self-determination, self-esteem and a reasonable quality of life. The foundations of independence lie in the child's ability to initiate action on the social environment (people) and the physical environment (objects) and to respond to opportunities for interaction provided by those environments. Without the ability to initiate action upon the social and physical environments at will, independent behavior is not possible. The ability to interact effectively with the social environment in turn depends upon effective communication skills, while the ability to interact with the physical environment depends upon effective cognitive skills. Communicative and cognitive skills are essential to all functional experiences--be they daily living skills, academic pursuits, or recreational activities.

We and other authors have developed a number of products that describe communication and cognitive skill development in terms that are relevant for the child with deaf-blindness. However, selecting appropriate instructional targets is by no means the whole picture. Our experience has shown us that even when teachers understand what it is they should be teaching a child to do, they have difficulty providing opportunities for the child to employ those skills across classroom activities. Often, skills are taught in isolated programs that offer little practice and that are not integrated into general classroom activities. Or, appropriate skills may be targeted in one classroom activity, but not in other activities.

The goal of this project was to demonstrate how teachers may target communicative and cognitive opportunities across the entire spectrum of everyday classroom activities and thus increase independent behavior by their students with deaf-blindness. Final products would be designed to show teachers how to integrate opportunities for children with deaf-blindness to practice communicative and cognitive skills into their interactions with people and objects throughout the school day. The project was conducted in regular public schools in Oregon.

II. Project Objectives

This grant was originally awarded to Washington State University (WSU), but was transferred immediately to the Oregon Health Sciences University (OHSU). This occurred because the principal investigator, Dr. Rowland, had accepted a position in the Department of Pediatrics at OHSU, as did all of the originally identified project staff. No changes were made in staff, location, objectives, activities and timelines of this grant as a result of the transfer from WSU to the OHSU Center on Self-Determination. The Center is affiliated with the Oregon Institute on Disability & Development at OHSU. This transfer involved a change in organizational affiliation and administrative responsibility for the grant. The transfer caused a delay in the initiation of project activities, as it took several months to gain approval from the OHSU Internal Review Board.

Major components of the project included DEMONSTRATION, REPLICATION, DISSEMINATION, and EVALUATION. Progress toward each of these major objectives is summarized below.

DEMONSTRATION

Two classrooms were initially identified in the Portland Public Schools that served as model classrooms in Year 1. Between them, they served six children with vision and hearing impairments. Both classrooms were in the Portland Early Education Program and served children who were three to five years of age. These were the only classrooms in which more than one child labeled deaf-blind was being served in this school district. Because project staff had no control over the assignment of teachers or students to classrooms in succeeding years of the project, we were not able to maintain the same model classrooms for the next two years. Instead, we took into the project any classrooms in the Portland Early Education Program that currently included any children who had vision and hearing impairments. In Year 2, three classrooms were involved, all taught by new teachers, but serving four students from Year 1 plus four new students. In Year 3, one of the classrooms from Year 2 continued with the original teacher and two students continuing from Year 2 plus one new student. A no-cost extension was requested that consituted a fourth year for the project. During this fourth year, we worked with two students in different classrooms who had severe orthopedic impairments (one who continued from Year 3 and one new one) as we attempted to resolve some of the significant challenges posed by students who experienced both dual sensory impairments and severe orthopedic limitations.

Each year release time was arranged for staff from these classrooms to meet with project staff for an initial training session. The staff were provided with the conceptual background for project activities and the assessment and evaluation plans and materials. Parents were contacted individually to explain the project to them and seek their input and assessment information from the home.

Intervention plans were developed collaboratively with teachers, parents and related services staff for each target student. The focus of intervention was either the social environment (that is, the interactive behaviors of classroom staff or peers), the physical environment (that is, the materials and classroom arrangements), the child's skills, and, in most cases, all three. Classroom staff implemented interventions with support from project staff. Demonstrations were provided by project staff as necessary and support was provided in acquiring or adapting materials needed to nurture independence. Project staff met regularly with classroom staff to monitor performance data and to adjust intervention strategies responsive to the data.

REPLICATION

As discussed above, the original model versus replication classroom design was not possible. In effect, there were three replication classrooms in Year 2, and one continuing replication classroom in Year 3.

DISSEMINATION

Assessment and training materials were developed over the course of Year1, tested in participating classrooms in Year 2, and revised for Year 3. Validated assessment and training procedures appear as final products attached to this report. These materials will be disseminated to all 50 deafblind projects.

Project staff presented instructional strategies and research data relevant to this project to a wide variety of audiences. These presentations are listed in Section V, Project Impact. Several publications describing the education of children who are deafblind were also completed over the course of this project. These also are listed in Section V.

EVALUATION

A number of data systems were used by project staff and teachers to monitor the progress of individual students and to document changes in the conduct of classroom activities. These data are reported under Results in Section IV.

III. Participants, Model and Methods

In this section, we describe project participants, the instructional model developed and demonstrated through the project, and the instructional methods.

Participants

Participants were young children with vision and hearing impairments aged 3-5 enrolled in the Portland Public Schools Early Intervention Program in Portland, Oregon. Across the three years of the project, twelve children were involved, in six different classrooms. Table 1 reveals demographics for these participants and indicates the project years in which they participated.

Table 1. Demographics for All Participants

Subject	Age	Gender	Etiology	Additional impairments*	Project years
1	4	M	Prematurity	DD, MF, OI, SD	1
2	3	M	Unknown	DD, MF, OI	1
3	4	F	Respiratory arrest	DD, MF, OI, SD	1, 2
4	4	M	Traumatic brain injury	DD, MF, OI	1, 2
5	4	F	Peirre-Robin syndrome	DD, MF, OI	1, 2
6	3	F	Rett syndrome	DD, OI, SD	1, 2
7	5	F	Unknown	DD, SD	2
8	5	M	Williams syndrome, PKU	AU, DD	2
9	4	F	Cytomegalovirus	DD, OI	2, 3
10	4	M	Unknown	DD	2, 3
11	3	M	Prenatal anoxia	DD, OI, SD	3, 4
12	3	M	Traumatic brain injury	DD, MF, OI, SD	4

* Key to impairments in addition to vison and hearing impairments

AU = Autism
DD = Developmental delay
MF = Medically fragile
OI = Orthopedic impairment
SD = Seizure disorder

All of the children were nonverbal. Nine of the twelve experienced severe orthopedic limitations in addition to their sensory impairments: six of these students also experienced seizure disorders and six of were also medically fragile. In other words, these participants represented the more severe and complex end of the spectrum of disabilities associated with deafblindness.

Methods

The methods varied over the four years as the project model evolved, based on classroom experience and data analysis. The major activities of each year are described below.

Year One. During the first year, project participants in the original two classrooms were assessed using existing instruments–the Communication Matrix and the School Inventory of Problem Solving Skills. These instruments assess communicative and cognitive abilities, respectively. Project staff worked directly with participants as we explored how to integrate target skills into everyday activities. Observations were made of the classroom as a whole and videotapes were made of participants in specific classroom activities. Project staff developed observational data systems to track opportunities for children to use communicative and cognitive skills in classroom activities and worked on establishing reliability on these coding systems. An initial draft of the major final product, the environmental inventory, was also developed.

Year Two. In the second year, the emphasis shifted to teacher training and the monitoring of instruction provided by classroom staff in the three new classrooms involved in that year. (The classrooms from the previous year no longer included any children who qualified as "deafblind") The first version of "Time to Learn", an environmental inventory that constitutes the major product developed through this project, was tested this year.

Year Three. In the third year, the revised version of "Time to Learn" was used to structure intervention in the one continuing and one new classroom that were involved that year. After the school year was concluded, staff efforts were devoted to revising this instrument, as well as analyzing project data.

Year Four. A no-cost extension was requested, adding a fourth year to the project. During this year, we completed the final products. In addition, we decided to pursue further the needs of students who are deafblind who also have severe orthopedic impairment. Our experience with these students had been frustrating, especially in regard to teaching them cognitive skills that are reflected in object interactions.

The Model

The model that structured our approach is presented in Figure 1 (following page). It relies on a thorough assessment of child skills in communicative and cognitive developmental areas, and evaluation of the environment in terms of the support that it provides for students to practice existing skills and to learn to use new skills.

Assessment of Child Skills. The **Communication Matrix** (Rowland, 1990,1996) is used to assess the early communication skills of individuals who use any means of communication, including augmentative and alternative communication systems and presymbolic means. It is

Figure 1. Independence Project Model

Assessment			
Child's Communication Skills	**Opportunities provided by Social and Physical Environments for child to use communication skills**	**Child's Cognitive Skills**	**Opportunities provided by Social and Physical Environments for child to use cognitive skills**
Communication Matrix	***Time to Learn***	***School Inventory of Problem Solving Skills (SIPSS)***	***Time to Learn***

⇩

Intervention			
Acquisition of communication skills by child	**Adjustments to Social environment to promote learning**	**Adjustments to Physical environment to promote learning**	**Acquisition of cognitive skills by child**

⇩

Outcome	
Mastery of the Social Environment: Ability to initiate and respond to social interaction	**Mastery of the Physical Environment: Ability to initiate and respond to interactions with the physical environment**

⇩

INDEPENDENCE

organized according to four major reasons for communicating, and 23 specific communicative intents related to each of these reasons at seven levels of development ranging from pre-intentional behavior to combinations of two and three abstract symbols (beginning language). This instrument is attached. The **School Inventory of Problem Solving Skills**, or **SIPSS** (Rowland and Schweigert, 1997a), is designed to assess the cognitive skills of nonverbal children as demonstrated through their interactions with the physical environment. These instruments include 33 skills organized into three strands: Basic Skills with Objects; Ways to Gain Access to Objects, and Ways to Use Objects. It was normed on a nationwide population of children who were deafblind (Rowland & Schweigert, in press). This instrument is also attached.

Assessments of the Environment. **Time to Learn** (Rowland & Schweigert, 2000), developed through this project, is an environmental inventory that complements the two instruments that assess child skill described above. **Time to Learn** is designed to reveal to what extent a specific activity is encouraging learning and independence for a particular child and exactly how it is or isn't doing so. By an activity we mean a regular routine or program that occurs in a specific context: for instance, lunchtime, art, grooming, swimming, playtime, prevocational training, or opening circle. The idea is that a teacher should be able to look at any activity (and ideally all activities) and pinpoint certain generic strategies that are especially conducive to learning and independence. If appropriate strategies are not in place, the **Time to Learn** guide suggests ways to implement them.. This instrument is attached, along with an accompanying guide that provides instructional suggestions for teachers.

Time to Learn includes 70 statements related to eight sets of variables: Transitions; the Activity, Adult's Interaction, the Communication System, Peer Interaction, Opportunities to Communicate, Opportunities to Use Objects, and Materials. The communicative intents from the **Communication Matrix** (Rowland, 1990, 1996) are reflected in the opportunities to communicate that appear in Section F of **Time to Learn**. The skills from the **SIPSS** (Rowland & Schweigert, 1997) have been conceptually organized into skill clusters that make up the nine specific opportunities to use objects that appear in Section G of **Time to Learn**.

It is possible to assess the student's skills using the **Matrix** and the **SIPSS** and then use **Time to Learn** to help determine to what degree emerging or mastered skills are being targeted for that student in a specific activity. When all of these instruments are combined, one is able to address child skill, opportunity and motivation in a coordinated effort to overcome helplessness and encourage independence in children who are deafblind.

<u>Intervention Strategies</u>. Instruction targeting the selected skills was conducted by classroom staff with support from project staff in the form of demonstrations and regular consultation. Instruction involved the embedding of intervention into routine activities, the use of highly motivating materials and contexts, and the use of logically occurring antecedents and consequences to elicit and reinforce target skills, similar to "activity-based intervention" as described by Chen and Dote-Kwan (1998). Generalization opportunities were systematically built into instruction (Rowland & Schweigert, 1997a and b) and data on the acquisition of target behaviors were collected daily. The duration of intervention varied between participants,

depending upon their school attendance and whether they participated during one or two school years. Below is a vignette of a typical classroom activity revealing the opportunities that it provides for a child to use both communicative and cognitive skills.

At his schedule, Brian is given an opportunity to ***communicate about the upcoming activity****. Brian is asked "what's next?" He* ***selects the symbol*** *for circle time and hands it to his teacher who confirms his selection. Circle time is one of Brian's favorite activities. Before circle begins, Brian may* ***help the teacher prepare*** *for this activity. At the shelf, a* ***peer encourages*** *Brian to search for the tape recorder and a box of tapes that they sing along with. The teacher may hand Brian a cardboard circle to indicate where he is supposed to sit. In finding the same shape on the floor to sit on, Brian is* ***matching shapes****. There are so many great songs to sing and Brian gets to* ***request*** *one by choosing a tangible symbol for his favorite; he then selects the puppet associated with the song, showing that he* ***comprehends the meaning*** *of that new symbol. When they are ready to sing a favorite song, Brian may have the opportunity to* ***activate an object*** *by turning on the tape recorder. If it's necessary to turn the tape over, he may need to* ***ask for help****. Today's song is about a fuzzy bear. The teacher passes around a selection of toy bears one at a time, giving everyone the opportunity to* ***combine objects****. At the end of circle time, she passes around a basket, and asks the children to put the bears in the* ***container****.*

Outcome. The targeted outcome of assessment and intervention was mastery of the social and physical environments by the participants, as evidenced through their ability to initiate and respond to opportunities to interact with people and objects. Mastery would require the development of the communication and cognitive skills necessary to take advantage of such opportunities. Mastery would in turn impact positively upon the overall independence of the child.

IV. Research Results

Data are reported on participants from the second and third years of the project, as the major data systems and intervention strategies were being developed during the first year. For these participants, the data span the entire duration of participation, which involved two consecutive school years for some of the participants. Data on the two participants in the fourth year are reported separately.

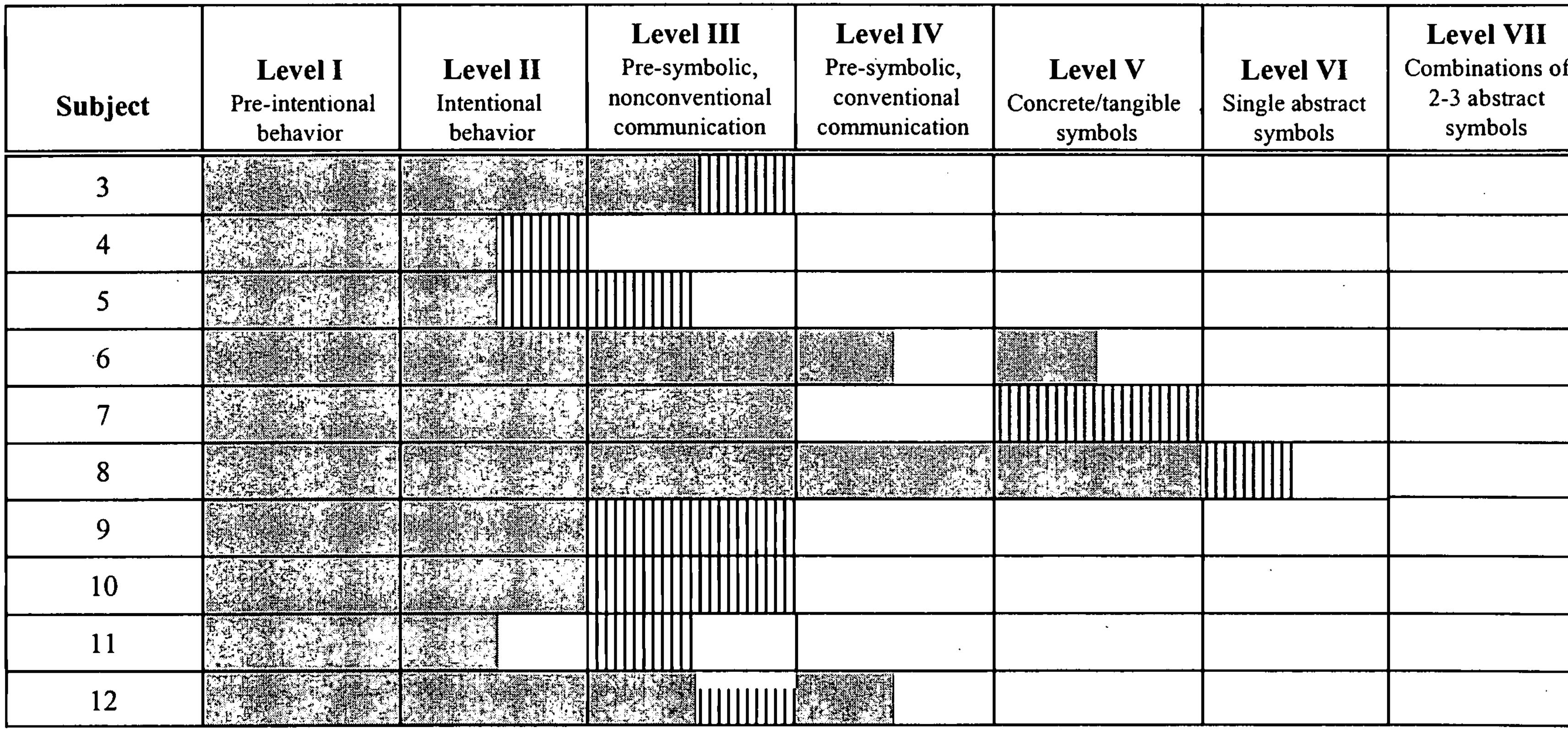
There are a number of types of data. The **Communication Matrix** and the **SIPSS** were administered on a pre-post basis, showing the development of specific skills by participants over the course of project participation. Specific skills targeted and acquired during direct intervention constitute another source of data. Videotapes were made approximately monthly over the course of each school year to document changes in learning environments and student performance in a specific activity that targeted both communication and cognitive skills. Three different analyses were made of these videotapes. The first documented the rate and type of communicative behavior on the part of the participant, coded on 30-second intervals. The second documented the rate and type of object interactions on the part of participants, coded on 60-second intervals. The third was the **Time to Learn** inventory which was administered after viewing each videotaped activity. For these three data systems, data are collapsed across the first two sessions versus the last two sessions to contrast performance at the beginning and end of intervention. Finally, in Years 2 and 3 observations were made of all classroom activities occurring across an entire school day to determine the extent to which all students were demonstrating specific object interaction skills. Results from these data systems are reported below.

Skill Development by Individual Participants

Communication Matrix. The **Communication Matrix** (Rowland, 1990, 1996) evaluates communication using any means (presymbolic, symbolic, augmentative or alternative means). The Matrix was administered at the start and conclusion of intervention to gauge overall communication development over the course of participation. Figure 2 shows pre-and post-intervention levels for each participant. Only two participants (#6 and #8) entered the project with symbolic communication, in both cases through the use of picture symbols (Level V): #8 exited the project with some abstract symbolic communication emerging (Level VI). Another student (#7) entered with solidly intentional presymbolic communication (Level III), and exited with a vocabulary of tangible symbols (Level V). None of the other students entered with intentional presymbolic communication skills mastered (that is, all were at Level II, except for one with emerging Level III skills). By the end of the project, one of these students had acquired tangible symbol systems (Level V), five had progressed to Level III (emerging or mastered), and one remained at Level II. Thus, all of these students were intentional communicators by the end of intervention except for # 4.

SIPSS The **SIPSS** (Rowland & Schweigert, 1997) evaluates cognitive ability as revealed through the child's interactions with the physical environment. The **SIPSS** was used to assess participants's cognitive skills before and after intervention. Each item is scored as "Not Present", "Emerging", "Mastered with Limitations" or "Mastered." Table 2 shows these scores,

Figure 2. Communication Matrix level at start and conclusion of intervention



Start of intervention | Conclusion of intervention

Completely filled cells indicate mastered levels, half-filled cells indicate emerging levels.

which are expressed as a percent of the maximum possible score. The average gain was 20%. Table 2 also shows the type of gains demonstrated by each participant in terms of the shift from one score to another. Gains in scores would include progressing from scores of "Not Present" to "Emerging", from "Not Present" to "Mastered"/"Mastered with Limitations" and from "Emerging" to "Mastered"/"Mastered with Limitations". At the conclusion of intervention, all students showed some emerging new skills that had previously been scored "Not Present": five students showed mastery of some skills that had previously been scored "Not Present": and two showed skills that had improved from "Emerging" to "Mastered". It should be noted that Subject 6 experienced periods of very poor health and attended only 28% of all instructional days. Subject #11 experienced cerebral palsy (spastic quadriplegia) and seizure disorder. His gains were few and he is an example of a child with profound orthopedic impairments for whom the attainment of object interaction skills was extremely challenging.

Table 2. Pre-post intervention SIPSS scores and type of gain for participants

			Type of Gain		
Subject	Pre-intervention SIPSS	Post-intervention SIPSS	Not Present to Emerging	Not Present to Mastered*	Emerging to Mastered*
6	36%	44%	1	3	2
7	45%	58%	3	4	
8	51%	77%	7	5	
9	30%	73%	4	12	
10	26%	56%	5	3	10
11	7%	9%	1		

* Includes "Mastered with Limitations"

Specific Object Skills Targeted and Gained. Table 3 (following page) shows the specific object interaction skills that were targeted in instructional programs for each participant, with the skills actually acquired by the end of the intervention period indicated.

Specific Communication Skills Targeted and Gained. For students who already communicated intentionally using presymbolic behaviors (Communication Matrix Level III or above), communication goals focused on the acquisition of symbolic communication, in most cases using tangible symbols (objects or pictures used as symbols). For students without intentional presymbolic communication (Communication Matrix Level II or below), communication goals related to the development or strengthening of presymbolic means for intentional communication. Table 4 (following pages) shows the specific communication skills that were acquired in instructional programs for each participant by the end of the intervention period.

Expressive Communication Code. Direct intervention programs were videotaped monthly, and the Expressive Communication Code was administered to the videotaped sessions. This observational system tracks the rate and type of communication produced by participants. The code is administered on a modified frequency basis: the presence or absence of each category of behavior is scored during each 30-second interval. Dependent variables coded are intentional communicative behaviors by the student, categorized as vocalizations, gestures, use of mechanical devices, object symbols, picture symbols, manual signs, printed words or spoken words (including word approximations) and initiated communicative behavior (communication

Table 3. Object Interaction skills targeted and acquired (+) by participants

Subject 6

Opens Simple Container +

Removes Barrier +

Simple Search +

Takes Out +

Makes Detour

Puts In

Subject 7

Removes Barrier +

Opens Simple Container +

Takes Out +

Simple Search +

Puts In +

Functional Use +

Uses One Object on Another-Simple

Subject 8

Over/Under Barrier +

Makes Detour +

Simple Search +

Complex Search +

Functional Use +

Uses One Object on Another-Simple +

Opens Complex Container +

Uses One Object on Another-Complex +

Operates Complex Object

Subject 9

Puts In +

Takes Out +

Orients +

Activates Simple Object +

Adjusts Plane +

Simple Search +

Opens Complex Container +

Uses One Object on Another-Simple +

Over/Under Barrier +

Rotates Shape

Puts Together

Subject 10

Locates +

Removes Barrier +

Activates Simple Object +

Functional Use +

Opens Simple Container +

Takes Out +

Simple Search +

Puts In

Subject 11

Approaches +

Activates Simple Object +

Holds Two Objects

Releases

Table 4. Specific communication skills gained by project participants

Subject 3

Gain attention

Request more action

Request more object

Request new object

Request new action

Subject 4

Continue action

Obtain more object

Attract attention

Subject 5

Request attention

Obtain more object

Continue action

Request more action (emerging)

Request more object (emerging)

Subject 6

Acquired 5 two-dimensional tangible symbols

Subject 7

Acquired 17 three-dimensional tangible symbols

Subject 8

Acquired 38 two-dimensional tangible symbols

Subject 9

Acquired 15 two-dimensional tangible symbols

Subject 10

Gain attention

Request more action

Request more object

Acquired 2 three-dimensional tangible symbols

Subject 11

Request attention

Request new action

Request new object

Request more object

Subject 12

Request attention

Request new object

not directly preceded by a cue for communication from a teacher or peer). For purposes of this project, the initiation of communicative behavior is a tangential but potentially relevant measure, and those data appear in Table 5. Table 5 shows the probability of initiated communication averaged over the first two videotaped sessions and the last two sessions. The mean gain across students was .07. Change in scores is uneven across participants, most probably because this measure is closely tied to the participants' initial level of communication and to the communication behaviors targeted. (Some behaviors lend themselves to frequent use during an activity while other ones don't, and often when new skills are introduced, rates of initiation drop temporarily. In other instances, increasing object interaction skills and the opportunities to use them will decrease the rate of communicative initiations because the learner is now spending more time engaged with objects.)

Table 5. Probability of initiated communicative behavior per 30-second interval

Subject	Start of intervention	End of intervention	Gain
3	.08	.39	+.21
4	.26	.25	-.01
5	.00	.12	+.12
6	.16	.08	-.08
7	.07	.09	+.02
8	.13	.31	+.17
9	.10	.09	-.01
10	.00	.09	+.09
11	.00	.04	+.04

Object Interaction Code. The videotapes of direct intervention activities were also coded using a second observational system that documents the incidence of specific object interaction skills (the skills that appear in Strands II and III of the SIPSS) and the initiation of object interactions. The specific object skills that appear in the videotaped activities varied according to what was being targeted at any particular time. For each participant, we created cumulative graphs showing the number of new object interaction skills that appeared session by session. These graphs appear in figures 3a through 3f (following pages).

Another measure derived from this data system that is tangential but potentially relevant to project goals is the incidence of initiated object interaction, which may be related to independent behavior. Table 6 shows the probability of initiated object interaction averaged over the first two videotaped sessions and the last two sessions for the six participants whose motor skills made the targeting of Strand II and III skills appropriate. Only one participant (#6) failed to show significant gains. She was the child with Rett syndrome who also experienced prolonged poor health.

Figure 3a. Participant # 6

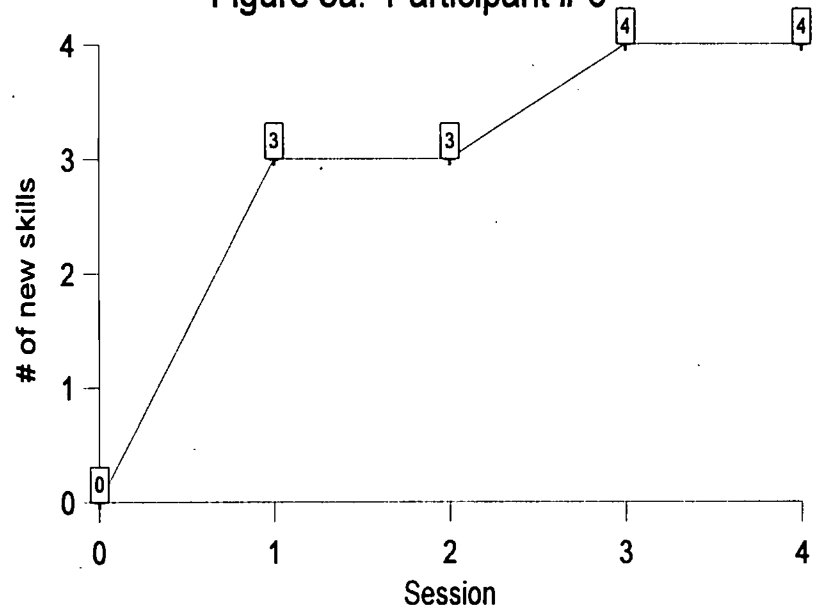


Figure 3b. Participant # 7

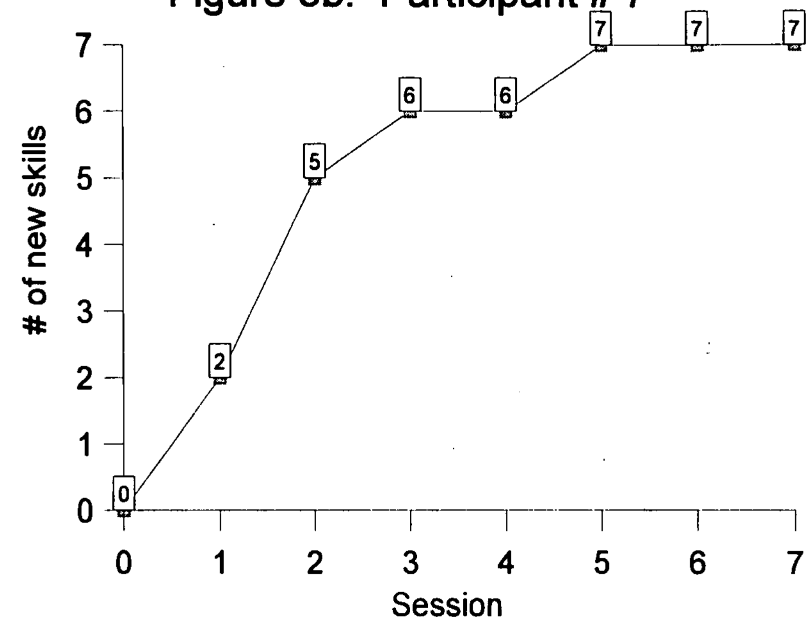


Figure 3c. Participant # 8

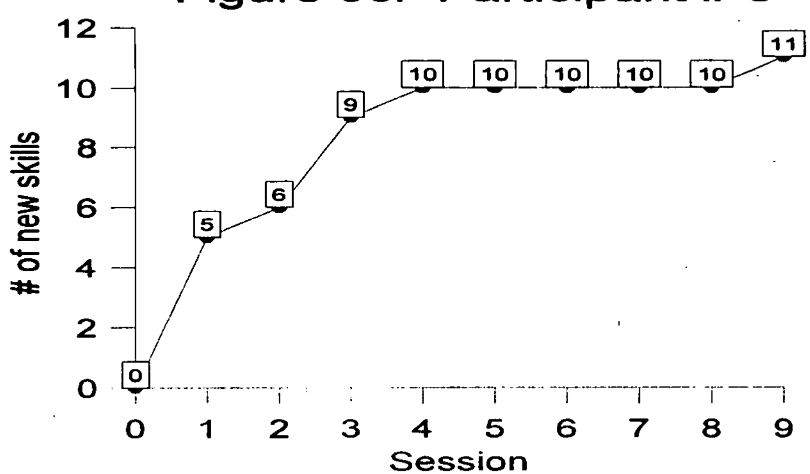


Figure 3d. Participant #9

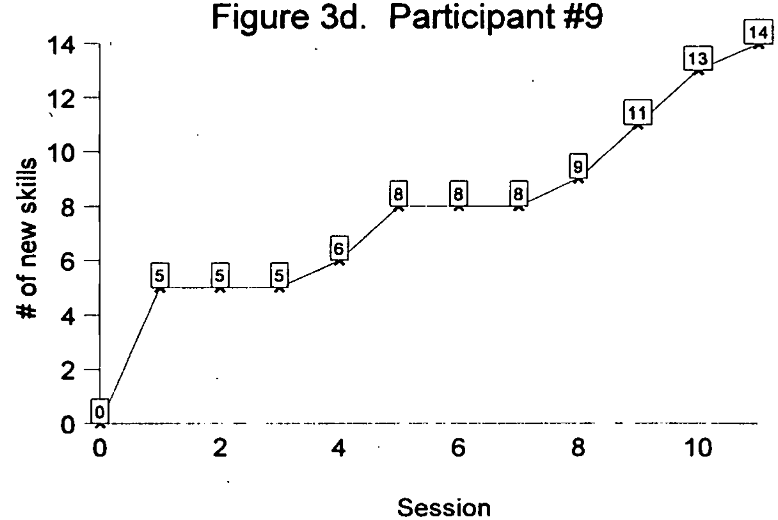


Figure 3e. Participant #10

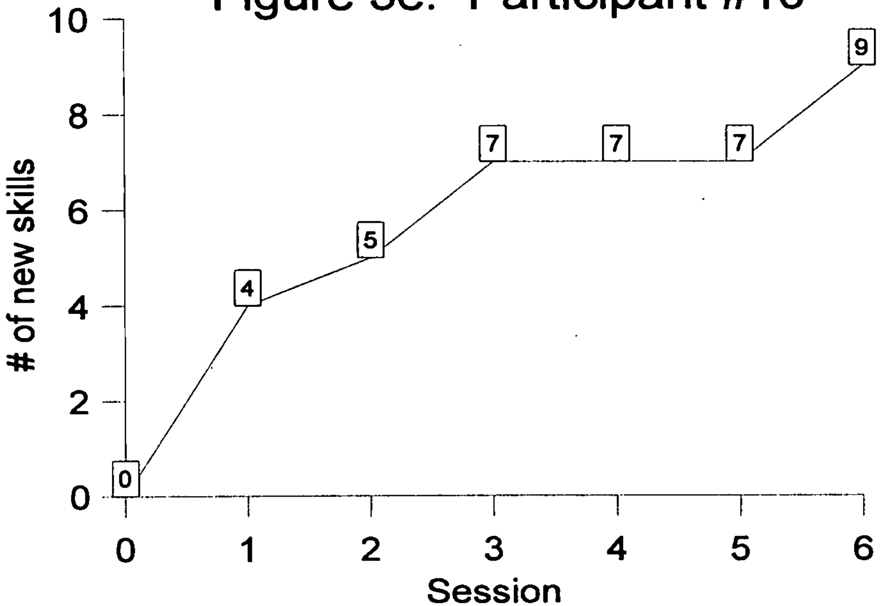


Figure 3f. Participant #11

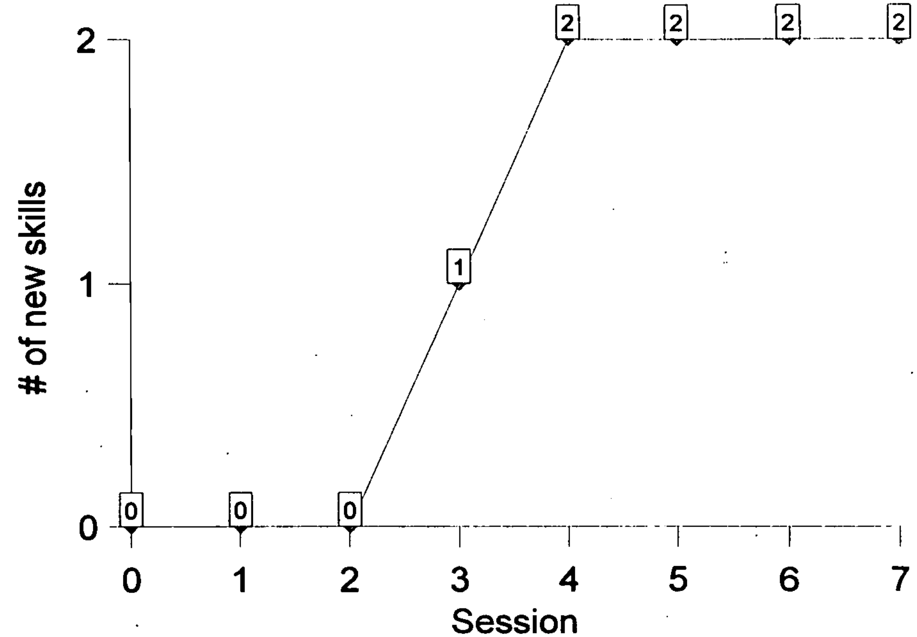


Table 6. Probability of initiated object interaction per 60-second interval

Subject	Start of intervention	End of intervention	Gain
3	Severe orthopedic impairment–only basic skills (Strand I) addressed		
4	Severe orthopedic impairment–only basic (Strand I) skills addressed		
5	Severe orthopedic impairment–only basic (Strand I) skills addressed		
6	.10	.10	.00
7	.07	.38	+.29
8	.32	.65	+.33
9	.11	.33	+.22
10	.29	.74	+.45
11	.00	.23	+.23

Quality of Classroom Activities

Time to Learn was also administered by project staff to the videotaped target activities for each participant to document changes in the overall learning environment that might be related to the improvements in child skills documented above. **Time to Learn** scores appear in Table 7. Scores are presented as percentages of the total number of items that were observed (out of 70 items) in target activities for each participant, and pre-and post-intervention scores are presented. All monitored activities showed gain on this measure, which reflects the environmental conditions that might promote learning and independence. The mean gain was 15%.

Table 7. Time to Learn score

Subject	Start of intervention	End of intervention	Gain
3	20%	33%	13%
4	24%	31%	7%
5	25%	35%	10%
6	35%	42%	7%
7	32%	47%	15%
8	42%	58%	16%
9	35%	59%	24%
10	28%	56%	28%
11	34%	47%	15%

Classroom-Wide Measures

This project went beyond direct intervention to examine the entire classroom as a context for effective instruction as opposed to separate activities for the students who were deafblind. One of the goals of the project was to develop strategies applicable to all students. Two measures allow us to examine changes in whole classrooms over the course of intervention.

The "Blitz". The items on the SIPSS were used in a different format, one that we call the "Blitz" (acknowledging the effort required of project staff who administered it). To administer the "Blitz", two project staff observed an entire classroom for the entire day, noting the incidence of any of the object interaction skills from Strands II and III of the **SIPSS** (Ways to Gain Access to Objects and Ways to Use Objects) as demonstrated by any students (project participants or not) in classroom activities (skills in Strand I, Basic Object Skills, are so ubiquitous that there is no point in documenting their occurrence on a classroom-wide basis). These data shed light on the degree to which typical classroom activities have been structured to allow opportunities to use object interaction skills for all students. Results are presented in terms of the percent of activities in which a particular skill was demonstrated by any student. Figures 4a and 4b (following page) present data from two administrations of the "Blitz" (Fall versus Spring)for one classroom from Year 2 for the items from Strands II and III, respectively. Figures 5a and 5b (following pages) present similar data from the Year 3 classroom. The Year 2 classroom showed increases in the incidence of 16 out of 24 skill categories across the two strands, while the Year 3 classroom showed increases in 20 of the 24 skill categories. These data suggest that opportunities to use object interaction skills did increase for all students in the classroom across activities.

Comparison of Classrom Activites for Project Participants versus Peers. Another way of measuring classroom-wide project impact is to compare the **Time to Learn** scores for the project participants who had vision and hearing impairments with those of their classroom peers, who had other impairments. Figure 6 shows the Year 3 **Time to Learn** pre and post-intervention scores averaged across the three project participants and peers in the same classroom. Both pre- and post-scores are virtually identical.. These results augment the "Blitz" data, showing that more general and diverse changes in instructional environments occurred across all students in the classroom..

Figure 4a. Strand II: Ways to Gain Access

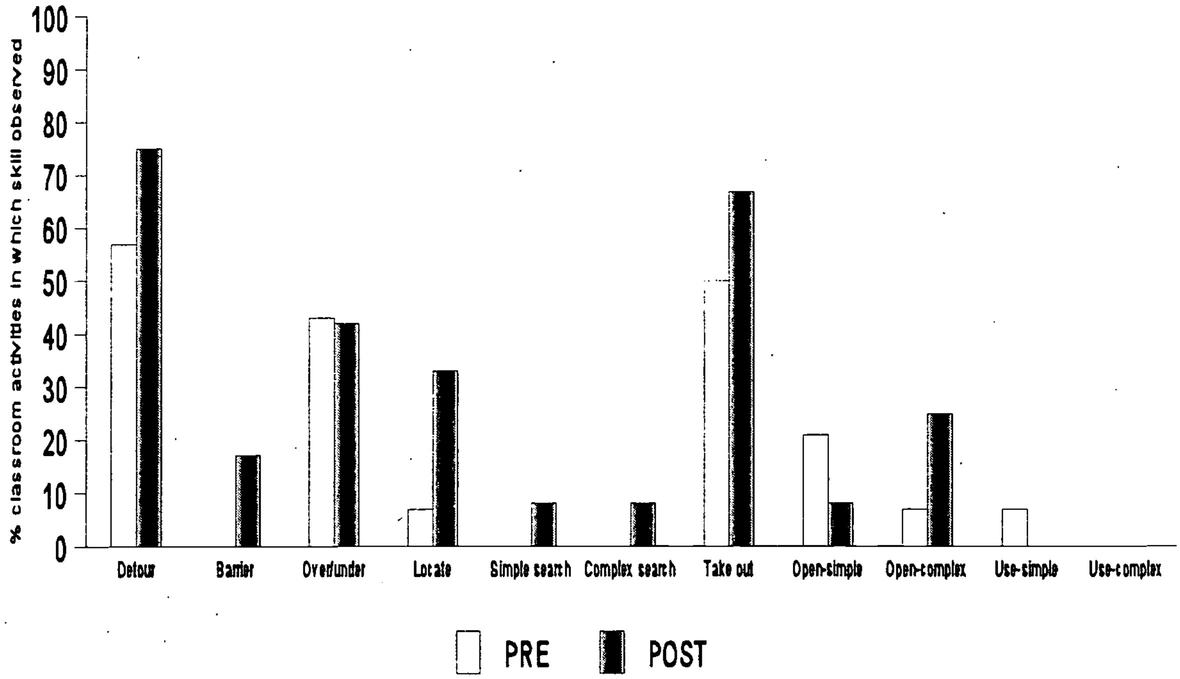
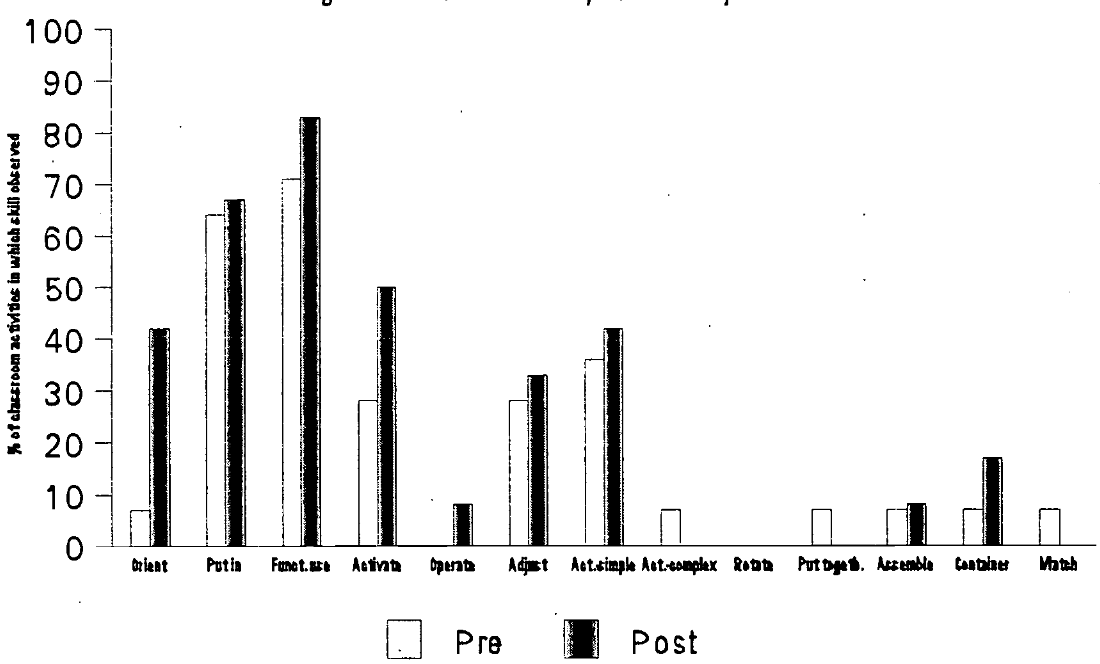


Figure 4b. Strand III: Ways to Use Objects



BEST COPY AVAILABLE

Figure 5a. Strand II: Ways to Gain Access

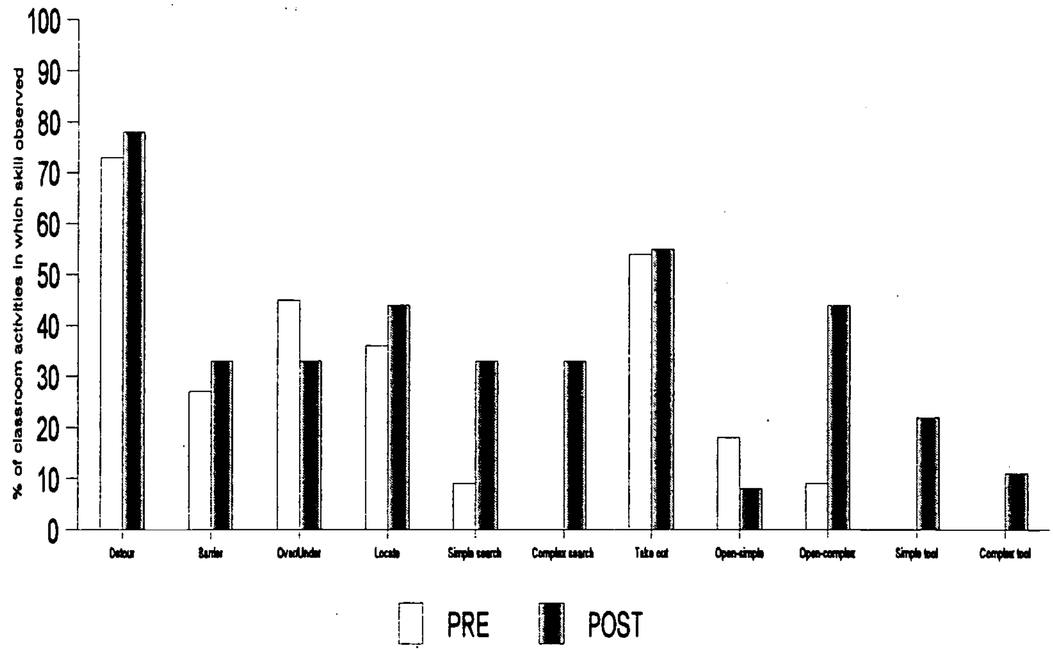
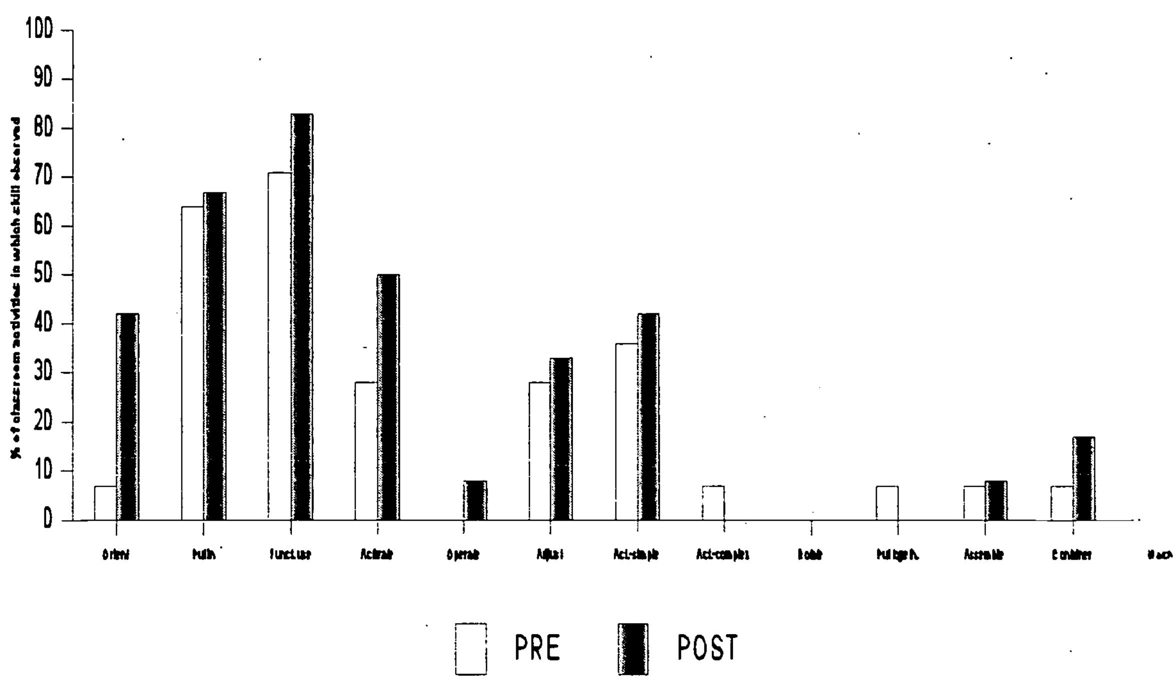
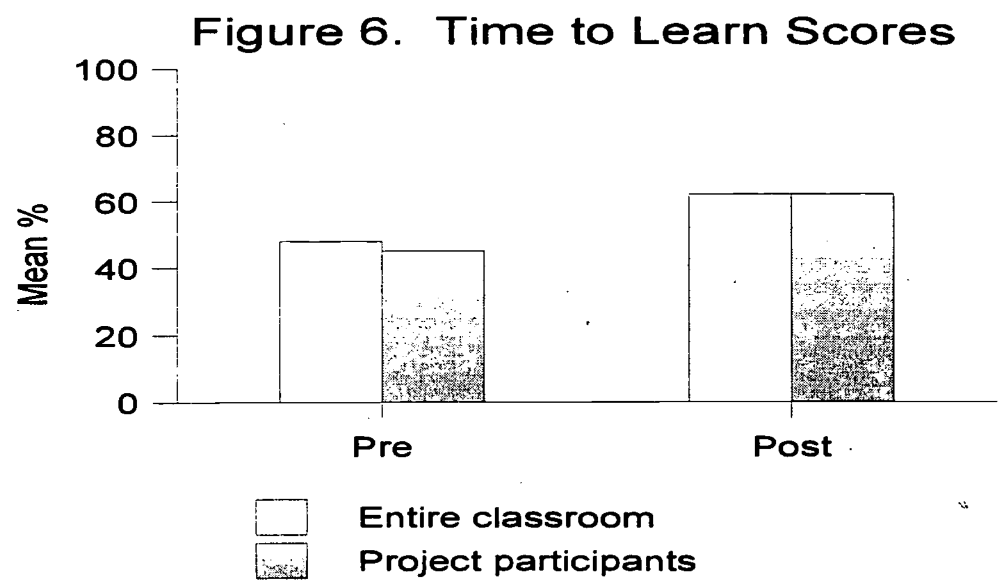


Figure 5b. Strand III: Ways to Use Objects



BEST COPY AVAILABLE



Discussion of Results from Years 2 and 3

This project involved the successful integration of communication and cognitive skills instruction into regular classroom activities and increased independence for most of the participants with deafblindness. Final products describe how to evaluate classroom activities to determine the extent to which they do or don't encourage learning and independence and provide detailed suggestions for increasing the learning value of activities. Strategies implemented in model and replication classrooms were equally effective for children with deafblindness and for their peers.

There was a subset of the participants, however–those with severe orthopedic impairment in addition to vision and hearing impairments–for whom we were not successful in teaching skills that involved manipulation of the physical environment. Clearly, where physical limitations prevent a child from acting directly on the environment, it is exceedingly difficult to impact upon their independence in this manner. These children often have uncontrolled seizure activity as well as chronic poor health in addition to their specific impairments. Poor health reduces the number of days they are able to attend school, and medications administered to control seizure activity may diminish alertness and reduce their readiness to attend to learning activities when they are at school. It is these children with the most severe and complex disabilities that continue to pose great challenges for educators and families.

Year 4 Results

In Year 4, we decided to continue intervention in a limited fashion to further pursue the potential for improving cognitive skills through object interactions with students who experience severe orthopedic limitations in addition to dual sensory impairments. Accordingly, we continued to work with participant #11 from Year 3, and also worked with one new participant (#12). Both of these participants had seizure disorders as well as severe orthopedic impairment, and #12 was also medically fragile. The results of this work are presented in Table 8, which presents pre-post intervention scores on all data systems for those two children.

Table 8. All data for two Year 4 participants

	# 11		# 12	
Measure	**Pre**	**Post**	**Pre**	**Post**
Communication Matrix Level	III(emerging)	III(mastered)	III(emerging) IV(emerging)	III(mastered)
Probability of initiated communication	.00	.10	.00	.05
SIPSS score	4%	11%	8%	10%
Probability of initiated object interaction	.60	.70	.58	.58
Time to Learn score	28%	31%	31%	41%
Specific object interaction skills acquired	Simple actions + Explores + Activates simple object +		Functional use + Uses one object on another-simple + Activates simple object +	

Overall, these results were encouraging. The **SIPSS** scores show that object interaction skills were very limited: but the initiated object interaction data show that what few skills they had, they used frequently. Both students showed gains in communication level and in the rate of initiated communication, as well as the acquisition of specific object interaction skills that were reflected in gains in **SIPSS** scores. **Time to Learn** scores also improved.

V. Project Impact

Permanent Products

Two major products were developed through this project: the **Time to Learn** inventory and an accompanying manual. These products are attached to this report. They are in the process of final review by our graphic artist and will go the printer in the next month. When printed, they will be distributed to all of the state deafblind services projects.

Presentations

The following presentations related to the education of children who are deafblind were made to national conferences and project directors' meetings.

- Rowland, C. & Schweigert, P. <u>Tangible Symbols, Tangible Outcomes: Short Course</u>. American Speech-Language and Hearing Convention, Boston, November, 1997.
- Rowland, C., Schweigert, P., Brummett, B. & Mills, C. <u>Analyzing the Communication Environment to Encourage Functional Communication</u>. Portland Early Intervention Program workshop. February, 1998.
- Rowland, C., Schweigert, P., Brummett, B. & Mills, C. <u>Problem Solving Skills in Young Children with Multiple Disabilities</u>. Portland Early Intervention Program workshop. April, 1998.
- Schweigert, P.D. & Rowland, C. <u>Concrete Bridge to Abstract Communication in Autism and Severe Disabilities</u>. International Society for Augmentative and

Alternative Communication, Dublin, August, 1998.

- Rowland, C. & Schweigert,P. <u>Creating Classroom Environments that Nurture Independence for Children with Deafblindness</u>. NTAC Project Directors' Meeting. OSEP Washington D.C., October, 1998.
- Schweigert, P. <u>Analyzing the Communication Environment</u>. Portland Early Intervention Program. Portland, OR. February, 1999.
- Rowland, C. & Schweigert, P. <u>Tangible Symbols, Tangible Outcomes</u>. Placer County Department of Special Education, Sacramento, CA, April, 1999.
- Rowland, C. & Schweigert, P. <u>Creating Classroom Environments that Nurture Independence</u>. NTAC Project Directors' Meeting OSEP. Washington D. C. October 1999.
- Schweigert, P. & Rowland, C. <u>Tangible Symbols, Tangible Outcomes–New Research and Case Studies</u>. CEC--Division for Early Childhood Conference on Children with Special Needs, Washington, D.C., December, 1999.
- Schweigert, P. <u>Tangible Symbol Systems; teaching strategies and case studies</u>. Yolo County SELPA Sacramento CA. March, 2000
- Schweigert, P. & Rowland, C. <u>Assessing the Problem Solving Skills of Nonverbal Children who have Multiple Disabilities</u>, 2000 CEC Annual Convention, Vancouver, B.C., April, 2000.
- Rowland, C. & Schweigert, P. <u>Tangible Symbols, Tangible Outcomes–New</u>

Research in Communication Intervention. 2000 CEC Annual Convention, Vancouver, B.C., April, 2000.

- Rowland, C. & Schweigert, P. Tangible symbols-tangible outcomes in communication for children with visual impairments or deafblindness. Early Connections Conference June, 2000. Vancouver, B.C.
- Schweigert, P. & .Rowland, C. Acess to Learning: an Environmental Inventory to Evaluate learning opportunities for children who are deafblind. Early Connections Conference. June, 2000. Vancouver, B.C.
- Rowland, C. & Schweigert, P. Tangible symbols-tangible outcomes in communication for children with visual impairments or deafblindness. Early Connections Conference June, 2000. Vancouver, B.C.
- Schweigert P. Problem solving and object interaction for the student with vision impairments or deafblindness. Texas Focus. June, 2000, El Paso, TX.
- Schweigert, P. Analyzing the Communication Environment for the child with vision impairments or deafblindness. Texas Focus Conference. June, 2000. El Paso, TX..
- Schweigert, P. Presymbolic communication for the child with multiple disabilities and vision impairments or deafblindness. Texas Focus Conference. June, 2000 El Paso, TX..
- Schweigert, P. Tangible symbol use by the child who is multiply-vision impaired

or deafblind.. Texas Focus Conference. June, 2000. El Paso, TX..

- Schweigert, P. & Rowland, C. Systematic instruction: the key to communication using tangible symbols. IASSID 11th World Congress. August, 2000, Seattle WA.

Project staff have been providing graduate level training for master's level students from Speech-Communication, Vision, and Early Childhood Special Education programs at Portland State University on an ongoing basis since Fall of 1998. In these seminars, we have presented the techniques developed through this project as methodologies that may be used to enhance the self-determination of young children with low-incidence disabilities, including deafblindness. In addition, a series of two-day workshops on communication for children who have multiple disabilities including deafblindness have been conducted in the following locations:

- Portland, OR, July, 1997.
- Minneapolis, MN, July, 1997.
- Honolulu, HI, August, 1997.
- Portland, OR July, 2000
- New York, N.Y. July, 2000
- Beaverton, OR, September, 2000
- Burlington, VT, October, 2000
- Worcester, MA, October, 2000

Publications

The following materials related to the education of children who are deafblind were published during the course of this project.

- Rowland, C. & Schweigert, P. Tangible symbols, tangible outcomes. Augmentative and Alternative Communication, 2000, 16 (2), 61-78.
- Rowland, C., & Schweigert, P. Enhancing Acquisition of Functional Language and Communication. In R. Silberman & S. Sachs (Eds.) Educating Students with Visual Impairments and Other Disabilities; Paul Brookes, 1998.
- Rowland, C. & Schweigert, P. (2000). Tangible Symbols Systems, Second Edition. Portland, OR: Oregon Health Sciences University.
- Rowland, C. & Schweigert, P. (2000). Time to Learn. Portland, OR: Oregon Health Sciences University.
- Rowland, C., Schweigert, P. (in press). Promoting Mastery of the Physical Environment in Children who are Deafblind through the Assessment and Instruction of Hands-on Problem Solving Skills. British Journal of Visual Impairment.

VI. Conclusions

Children who are deafblind may have great difficulty achieving independence. Severe sensory impairments may make it impossible to know what is going on in the environment–whether there is anyone else to communicate with, or anything to play with. Many children with deafblindness experience impairments in addition to vison and hearing impairments. Cognitive impairment may impede the integration of limited sensory experiences, while attention and memory deficits may detract from the child's ability to make sense of the environment. Orthopaedic impairment may reduce the child's experience with manipulating and exploring the physical environment. Health and neurological conditions, such as seizure disorders, may cause learning ability to vary on a daily or even hourly basis. All of these conditions may combine to limit the amount of information that these children receive about the environment through the natural processes of discovery, making it difficult for them to perceive appropriate ways to act upon the social and physical environments and to solve the problems that arise in those environments.

A number of authors have commented on the tendency to protect children with disabilities from challenges–a tendency that may have the effect of limiting experience and fostering dependency and helplessness rather than independence (Beveridge & Conti-Ramsden, 1987; Hauser-Cram, 1996; Jennings, Connor & Stedman, 1988; Lutkenhaus, 1984; Marks, 1998). Instructional approaches developed for children with special needs often assume a high level of dependency and end up reinforcing dependence (Mithaug, Martin & Agran, 1987). For instance, passive sensory stimulation and hand-over-hand assistance--techniques promoted specifically for young children with deaf-blindness--are very likely to promote passivity (Chen, 1995). Certain training strategies may actually suppress child-initiated behavior that would arise naturally out of the child's own preferences and motivations. For example, requiring repetitious labeling of objects or stacking blocks merely for the sake of practice may dampen the child's enthusiasm for using those skills in other, more functional or rewarding contexts. Another tendency is to over-prepare for learning activities in an effort to create systematic and predictable environments. It is possible that an early emphasis on maintaining a relatively static environment discourages educators from subsequently providing the variety that is found in typical environments, a variety that naturally presents the need to learn new skills.

The combination of multiple impairments and repeated experiences in uninteresting or unmotivating situations associated with experiences of failure, frustration and lack of control may lead to excessive passivity and disinterest in stimuli and events. A sense of helplessness may result (Seligman, 1975), reducing independence by dampening the desire to act on or respond to the environment in new and effective ways.

Initial learning of new skills by children who are deafblind often requires sustained and highly structured instructional efforts. Unfortunately, learning new skills in highly structured contexts does not guarantee that the child will learn to use those skills independently. Independence requires generalization of skills across a variety of partners, materials and contexts. Independent behavior requires that skills occur in response to the natural cues and contingencies that occur in any environment, whether they are specifically targeted by the teacher or not.

The **Time to Learn** inventory and manual are designed to help teachers become aware of the natural cues for certain types of behavior that do exist, and to be able to arrange the social and physical environment to provide more of those natural cues in a manner that is evident to the learner. Naturally-occurring stimuli may be either external to the student (e.g., when the lack of a needed material prompts the student to initiate a request for more), or internal to the student (e.g., when a full bladder prompts the student to go to the bathroom). Shifting the control of behavior from non-natural, highly contrived stimuli to naturally-occurring stimuli increases the probability that skills will be demonstrated in response to naturally-occurring conditions.

What appears to be learned helplessness in children who are deafblind may actually turn out to be a lack of skills, a lack of opportunities to learn new skills (Marks, 1998), or a lack of motivation. The instructional model and materials developed through this project may help to address all three of these potential causes of helplessness. To the extent that helplessness is caused by a lack of skills, the **Communication Matrix** and **SIPSS** assessments provide a way to assess the presence and absence of skills needed to master the social and physical environments. To the extent that helplessness is caused by lack of opportunity, **Time to Learn** may be used to survey an activity and determine how opportunities to learn new skills or to practice existing skills may be embedded into it. To the extent that helplessness is caused by lack of motivation, **Time to Learn** is guided by the principle that learning occurs best in situations that build upon the learner's own motivations, preferences and affinities. If the environment is arranged to provide successful and intrinsically compelling opportunities to use skills, then children are more likely to have both the understanding (or skills) and the motivation necessary to explore and initiate new actions upon the environment. It is probably unreasonable to expect that a teacher could duplicate for students with severe sensory impairments the high rates of independent behavior typically shown by children without disabilities. It is possible, however, to create an environment that is full of powerful reasons for the learner to interact with the social and physical environments.

VII. Assurance Statement

A full copy of this final report has been sent to ERIC and copies of the title page and summary have been sent to the NECTAS Coordinating Office. In addition, final products will be sent to all state deafblind services projects.

References Cited

Beveridge, M. & Conti-Ramsden, G. (1987). Social cognition and problem solving in persons with mental retardation. Australia and New Zealand Journal of Developmental Disabilities, 13 (2), 99-106.

Chen, D. & Dote-Kwan, J. (1998). Early intervention services for young children who have visual impairments with other disabilities and their families. In S.Z. Sacks and R.K. Silberman (Eds.), Educating Students Who have Visual Impairments with Other Disabilities (pp. 303-338), Baltimore: Paul Brookes.

Hauser-Cram, P. (1996). Mastery motivation in toddlers with developmental disabilities. Child Development, 67, 236-248.

Jennings, K.D., Connors, R.E., & Stegman, C.E. (1988). Does a physical handicap alter the development of mastery motivation during the preschool years? Journal of Child and Adolescent Psychiatry, 312-317.

Lutkenhaus, P. (1984). Pleasure derived from mastery in three-year-olds: Its function for persistence and the influence of maternal behavior. International Journal of Behavioral Development, 7, 343-358.

Marks, S.B. (1998). Understanding and preventing learned helplessness in children who are congenitally deaf-blind. Journal of Visual Impairment and Blindness, March, 200-211.

Mithaug, D., Martin, J.E., Agran, M. (1987). Adaptability Instruction: The Goal of Transitional Programming. Exceptional Children, 53(6), 500-505.

Rowland. C. (1990, 1996). Communication Matrix. Portland, OR. Oregon Health Sciences University.

Rowland, C. & Schweigert, P. (1997a). Hands-on problem solving skills for children with deafblindness (SIPSS, HIPSS, TAPPS and Guide to Assessment and Teaching Strategies). Portland, OR, Oregon Health Sciences University.

Rowland, C. & Schweigert, P. (1997b). Hands-on problem solving skills for children with deafblindness: Final report. Portland, OR: Oregon Health Sciences University.

Rowland, C. & Schweigert, P. (2000). Time to Learn. Portland, OR: Oregon Health Sciences University.

Rowland, C., Schweigert, P. (in press). Promoting Mastery of the Physical Environment in Children who are Deafblind through the Assessment and Instruction of Hands-on Problem Solving Skills. British Journal of Visual Impairment.

Attachments

Communication Matrix

School Inventory of Problem Solving Skills

Time to Learn (includes Time to Learn Inventory)

Where Healing, Teaching and Discovery Come Together

OHSU
OREGON
HEALTH
SCIENCES
UNIVERSITY

NOTICE

REPRODUCTION BASIS

- [ ] This document is covered by a signed "Reproduction Release (Blanket) form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.

- [x] This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").