DOCUMENT RESUME

ED 455 663 EC 308 628

AUTHOR	Rosenberg, Steven; Clark, Mary; Finkler, Deana; Filer, Janet; Robinson, Cordelia
TITLE	Project Participate Final Report, September 1985-August 1988.
INSTITUTION	South Carolina Univ., Columbia. Center for Developmental Disabilities.; Winthrop Coll., Rock Hill, SC.
SPONS AGENCY	Special Education Programs (ED/OSERS), Washington, DC.
PUB DATE	1989-12-00
NOTE	111p.; Winthrop University was formerly Winthrop College. Staff and students at the University of Nebraska at Omaha assisted in the preparation of this document.
CONTRACT	G008530073
AVAILABLE FROM	University of South Carolina, Center for Developmental Disabilities, Benson Building, Columbia, SC 29208; Tel: 803-777-4839. Human Development Center, Winthrop College, School of Education, Rock Hill, SC 29733; Tel: 803-323-2244.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	MF01/PC05 Plus Postage.
DESCRIPTORS	Decision Making; Disability Identification; *Early Intervention; *Models; *Physical Disabilities; Physical Mobility; Preschool Education; Program Effectiveness; *Program Evaluation; *Student Participation; Training

ABSTRACT

The environments of most young children present many opportunities for learning. However, preschoolers who have severe motor disorders are frequently unable to explore the world around them. Project Participate addressed the problems presented by the limitations placed on the activities of preschoolers who have severe motor disorders. During the course of this project a decision model and guidelines for interventions designed to enhance the ability of these children to participate actively in their educational programs were developed. Interventions to increase child participation in the areas of play with preschool materials, communication, social interaction, and mobility are described. The results of the evaluation of the project are presented. These findings indicate that this project was well received by educational personnel and the interventions that were used significantly increased active involvement by preschoolers with disabilities. Dissemination and staff training activities are described. In addition, training materials, including guidelines for implementing interventions to increase child participation are provided. (Author)

UNIVERSITY AFFILIATED PROGRAM of South Carolina

FINAL REPORT: PROJECT PARTICIPATE
SEPTEMBER, 1985 - AUGUST, 1988

DEPARTMENT OF PSYCHOLOGY
UNIVERSITY OF NEBRASKA AT OMAHA
OMAHA, NEBRASKA 68182-0274

A joint program of the University of South Carolina and Winthrop College

UNIVERSITY OF SOUTH CAROLINA
Center for Developmental Disabilities
Benson Building
Columbia, South Carolina 29208
(803) 777-4839

WINTHROP COLLEGE
Human Development Center
School of Education
Rock Hill, South Carolina 29733
(803) 323-2244

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December, 1989

Funded by the United States Department of Education
HCEEP Demonstration Project Grant # G008530073

Steven Rosenberg, Ph.D., Director
Mary Clark, M.S., Coordinator
Deana Finkler, Ph.D., Evaluator
Janet Filer, M.A., Research Assistant
Cordelia Robinson, Ph.D.

This report is distributed by the Human Development Center, Winthrop College, Rock Hill, South Carolina 29733

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ABSTRACT

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ACKNOWLEDGEMENTS

The staff of Project Participate wish to acknowledge the many individuals who contributed to this project. Many staff and students at the University of Nebraska at Omaha provided assistance. Ms. Lorraine Davern, our secretary and Dr. Kenneth Deffenbacher, Chair of Psychology, deserve special mention along with the folks at Grants Development, Grants Accounting and Personnel. Dr. David Buekelman of the University of Nebraska - Lincoln's Barkely Center - deserves special mention. He contributed both ideas that have formed the core of Project Participate's conceptualization and the technical expertise that made our augmentative communication interventions possible. Mr. Dick Young, who heads Barkely's Media Center, repeatedly came to our aid. Several people from Meyer Children's Rehabilitation Institute were absolutely invaluable - Dr. Corry Robinson, Ms. Nancy Fieber, Mr. Wayne Stuberg and Ms. Mike Queen. Dr. Patty Hutinger and her Project ACTT staff were enormously helpful and supportive. Project Participate received valuable assistance from its consultants - in the area of software development we thank Mr. Jim Keefe of the Warren Achievement Center, Dr. John Boyd, Mr. Bill Winsor, Dr. Liz Lahm and Dr. Rick Short - in the area of program development we thank Dr. Tanya Suarez and Dr. Joicy Hurth of NEC*TAS - for help conceptualizing our work we thank Dr. Paula Beckman, Dr. Pip Campbell, Dr. Jim MacDonald, and Dr. Shirley Zeitlin - for consultation on powered mobility we thank Dr. Charlene Butler. Thanks also go to Dr. Susan Hupp who is largely responsible for the intervention strategies section of this report. Ms. Susan DeCaluwe deserves recognition for her consultation on children we served and for her work on the syllabus. Special thanks go to Project Participate's Advisory Group: from the Lincoln Public Schools - Dr. Linda Douglas, Ms. Betty Ells, Dr. Bill Falls, Mr. Chuck Friesen, Mr. Tom Fortune, Mr. Al Radke, and from the Nebraska Department of Education - Ms. Karen Stevens, and Ms. Jan Thelan. We also thank the staff at Winthrop College, particularly Ann Aheron, who typed and retyped this report. Finally and perhaps most importantly, Project Participate acknowledges the contributions of the staff, students and families of the Lincoln Public Schools. Dr. Sherrill, Director of Special Education and Dr. Douglas, Early Childhood Special Education Supervisor, created a place for Project Participate within the Lincoln Public Schools. Mr. Workman supervised the project's finances for the schools. The staff of Project Participate are also extremely grateful to the staff of Lincoln's Early Childhood Special Education Program. Thanks are due to Diane Ramel and the Occupational and Physical therapy staff who provided esssential skills, as did the Speech and Vision consultants. These professionals worked with us as team members to plan and carry out interventions. Finally, we thank the school's custodians, who were repeatedly willing to share their time and tools. Obviously Project Participate could not have existed without these children, parents and school personnel.

RATIONALE

Importance of Active Participation to Child Learning

Children learn by acting on their environment. Numerous studies support the importance of active learning for the growth and development of young children. Within the developmental literature, both theory (e.g., Bruner, 1975) and empirical study (e.g., Uzgiris & Hunt, 1975; Yarrow & Pederson, 1976) concur in emphasizing the importance of children having experience with acting directly on their environment for cognitive and social growth. Environments that offer few opportunities for active learning discourage development (e.g., MacPhee, Ramey & Yeates, 1984).

Children's development is also impeded when motor or sensory disorders restrict their access to opportunities for active learning (Robinson & Rosenberg, 1987; Robinson & Fieber, 1988). Much has been written about the need to provide children opportunities for learning. Far less has been written about the importance of helping children gain access to the opportunities their environment presents. In part, this oversight is due to the fact that most children have no difficulty taking advantage of the opportunities offered by their environment. However, children who have significant motor or sensory handicaps are frequently unable to gain access to learning activities. The impairment of motor skills has a significant impact on the extent to which young children can interact with the world around them. Several major areas of functioning are often affected by motor disorders:

a. Mobility because of impaired coordination of lower extremities.
b. Communication because of impaired oral-motor skills.
c. Hand use because of impaired fine motor skills.

Handicapped children, like all children, need opportunities to see the effect of their actions on their environment. When severe motor skill deficiencies prevent children from functioning as active learners, normal development may be hindered. Consequently when motor disorders restrict children's ability to learn and engage in social activities, compensatory procedures that maximize active involvement in their educational programs become necessary.

Realizing the Benefits of a Least Restrictive Environment

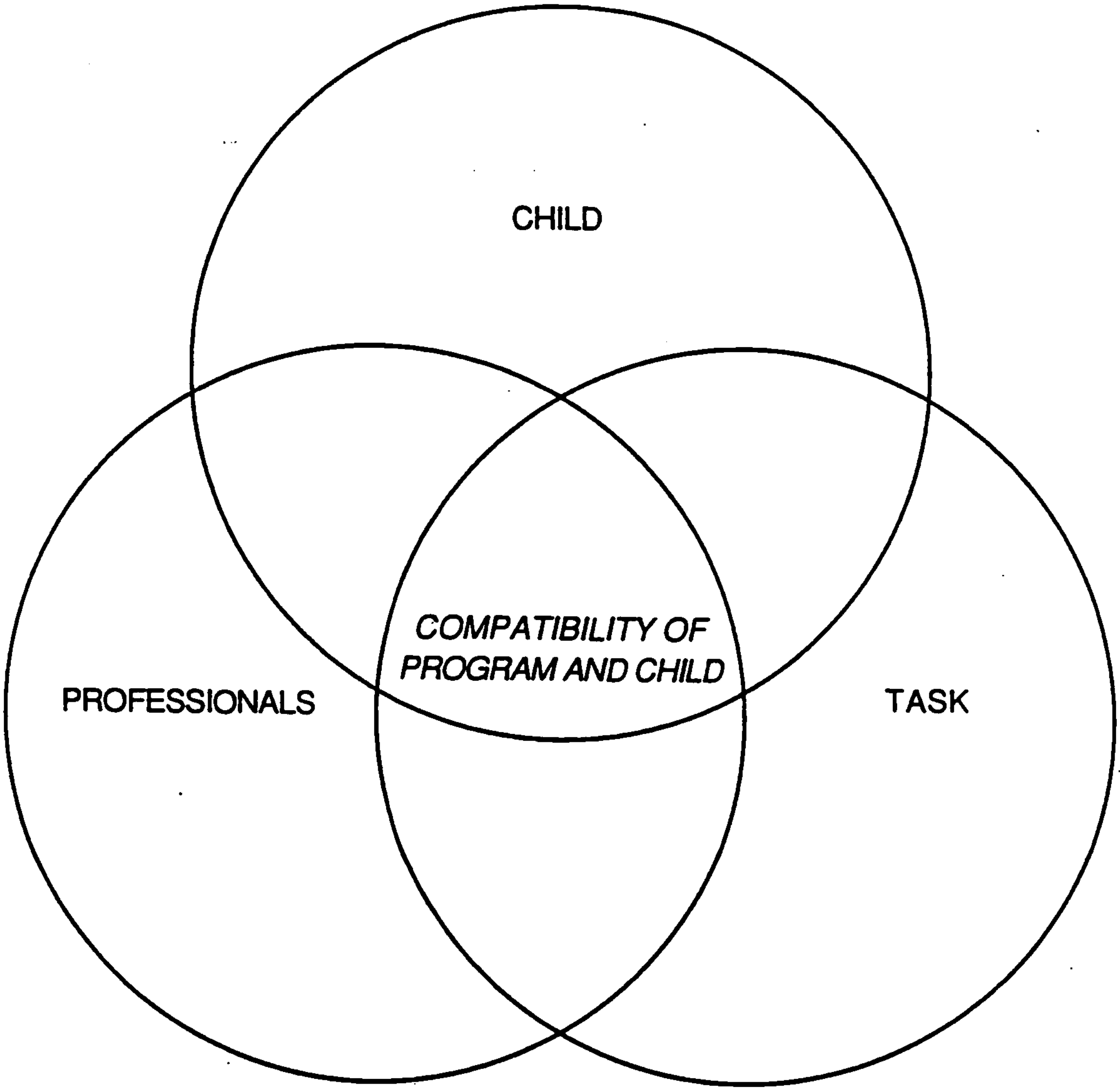
Some children are at higher risk than others for participation related problems. Children with physical or sensory handicaps are at a great disadvantage in learning because they have fewer opportunities to control events (either physical or social) in their environment than do nonhandicapped children. For the physically impaired child, this lack of interaction with responsive toys and the lack of control over events in their lives can have several undesirable effects (Brinker & Lewis, 1982; Robinson, 1976; Robinson & Fieber, 1988; Robinson & Robinson, 1983). First, it seems likely that the inability to gain access to manipulable and responsive playthings can produce developmental delays in cognitive, communication, social and self-help skills. Second, the motivation of such children to seek interesting activities may diminish. Children whose motor handicaps impede mastery of their environment display less persistence and curiosity than do their nonhandicapped peers (Jennings, Connors, Stegman, Sankaranarayan & Mendolson, 1985). In addition, clinicians who work with physically disabled children report attitudes of passivity on the part of some children; we are arguing that this passivity is, in part, the result of their inability to control significant events in their lives (Seligman, 1975). The importance of learning to interact with and to exercise control over events is not limited to physical objects; children also learn through interaction with their parents and peers. However, children who have significant physical, sensory, and cognitive handicaps are less effective in acting on their social environment and are less able to engage in mutually satisfying interactions with their peers, parents and teachers than are their non-handicapped peers (Jones, 1977; Kohl, Beckman, & Swensen-Pierce, 1984; Rosenberg & Robinson, 1988).

This impaired ability to act on the environment can be thought of as a consequence of a lack of compatibility between these young learners and their programs. Compatibility between program and learner encompasses the responses required by professionals and the tasks they present to learners in terms of the learner's cognitive, communication, sensory, motor and personal/ motivational abilities. When program and child are compatible, a match exists between the learner and the professional staff and the activities presented to the learners so that active and effective learner responses are possible (Zeitlin, 1985). This relationship between program and child is presented in Figure 1. The consequences of this incompatibility is, ultimately, a lack of achievement; when access to opportunities for learning are impeded, the ability to achieve is also impaired. A basic assumption made in the development of the Participate Decision Process is that access to program activities is necessary for active child participation in educational activities which, in turn, is necessary for achievement. These assumptions are presented schematically in Figure 2.

Following from the observations above, we feel it is important to offer home and classroom situations that systematically provide children, who have handicaps, opportunities to learn to control events and participate actively in their school activities in order to promote motivation and development of cognitive, communication and social skills. Increasingly, a variety of compensatory strategies are being used to expand the ability of disabled children to communicate and act directly on their environment. The use of assistive devices to help people overcome the effects of handicaps has generated considerable interest in recent years as these devices have become more sophisticated and more easily used than ever before. To a great extent, these improvements in assistive devices have come from applications of microcomputer technology to the development of powerful compensatory strategies. Great strides have been made in the user friendliness of this technology.

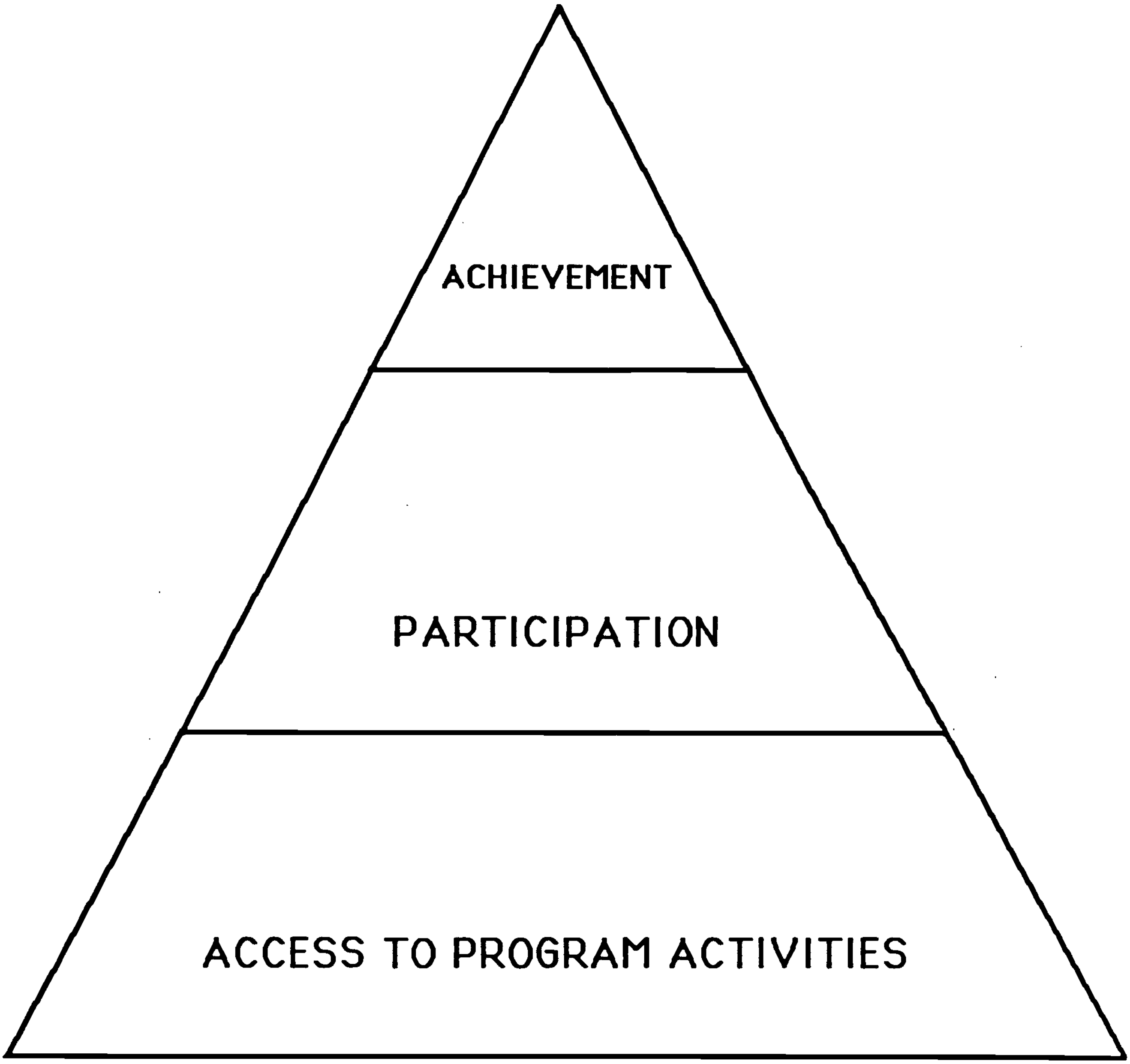
The purpose of this project was to develop strategies that would enhance the ability of children to engage in classroom and home program activities as independently as possible. The primary goal of this project was to develop and implement a model program designed to assist preschoolers having severe

Figure 1. A schematic representation of the influences on child and program compatability



Adapted from Zeitlin, 1985.

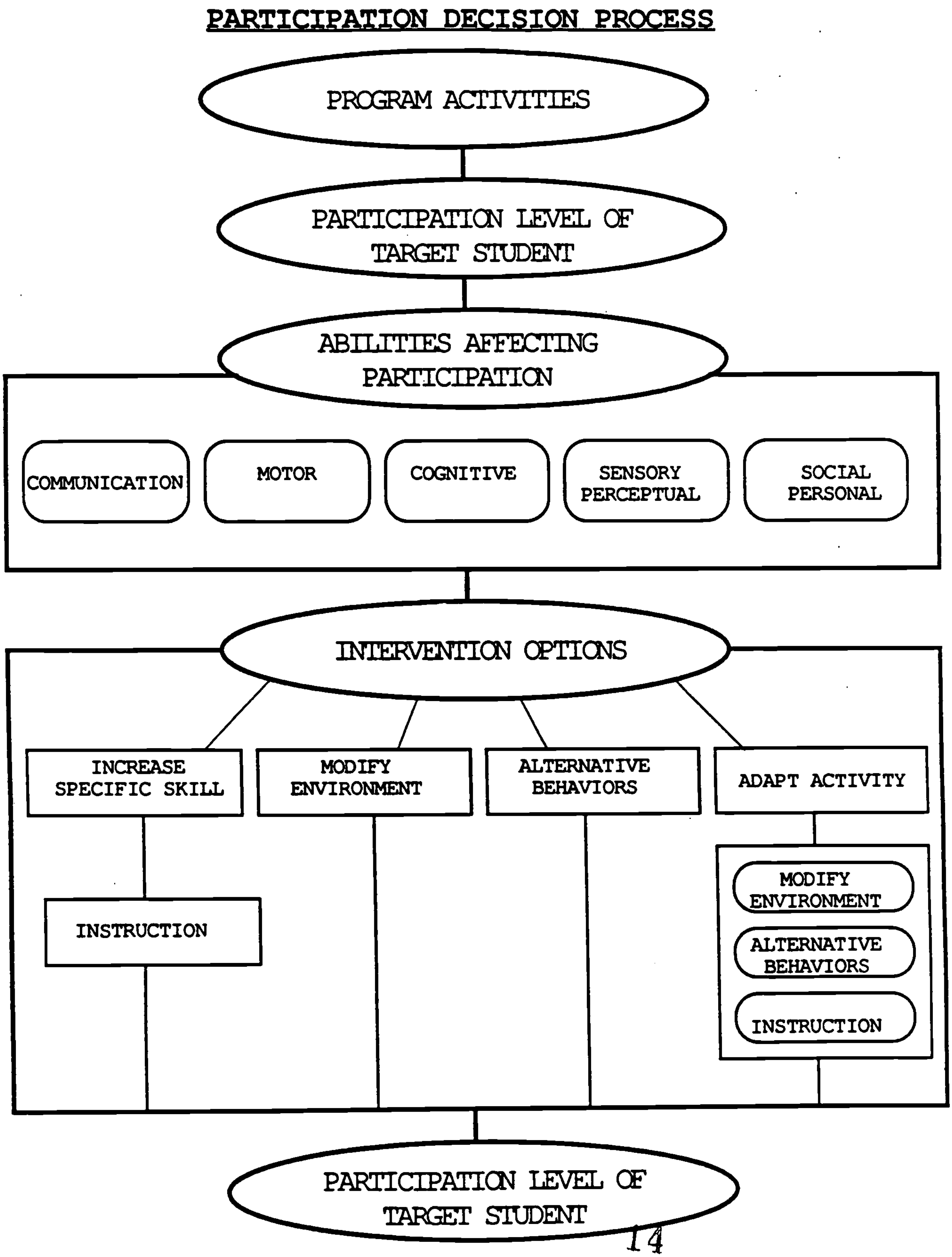
Figure 2. A schematic representation of the relationship between access to program activities and achievement



motor handicaps to participate actively, socially and academically, in integrated or mainstreamed classrooms and home based programs. Consequently Project Participate's central task has been to design learning activities and environments that are compatible with the abilities and limitations of preschoolers who have motor disorders and to enable these young learners to be effective, active participants in their educational programs. The project worked in a number of functional skill areas including communication, mobility, computer assisted instruction, and play with preschool materials. Interventions were applied within the framework of a model for planning and decision making. Project Participate's decision process represented in Figure 3 was originally constructed to guide professionals' efforts to match handicapped preschoolers' needs and abilities to the requirements of assistive technologies. This decision process guides our efforts to promote active participation by children. The use of this decision process (1) assists educators' efforts to analyze the extent of student participation in classroom activities, (2) identifies factors potentially contributing to low levels of child participation, (3) assists in the design of interventions that eliminate the barriers to active participation and (4) offers a model for evaluating the effectiveness of interventions designed to enhance child participation. This decision process was derived from work done as part of Project Participate (Rosenberg, Buekelman, Clark & Filer, 1987) and from work on participation done by Baumgart, Brown, Pumpian, Nisbet, Ford, Sweet, Messina and Schroeder (1982).

Project Participate's decision process is an approach to problem solving for the facilitation of child access and participation in program activities. This problem solving orientation focuses on the task of removing barriers to participation for activities in which learner involvement is low. Addressing specific activities in which participation is low helps focus efforts on the tasks of identifying and eliminating barriers to involvement in those activities and, thus, increases the likelihood of successful outcomes. Such a problem solving approach can be contrasted with approaches that may focus on participation globally, seeking to maximize participation throughout the day. The approach used here encourages efforts to remediate specific deficits in participation. This focus on increasing participation in specific activities has the advantage of making efficient use of staff time and available assistive devices by calling for these where they are most needed. Moreover, the emphasis upon increasing participation in areas where increases are most needed focuses staff attention upon a limited number of problems until these are solved. Finally, this model focuses on the task of giving children access to the activities their school and home environments offer and does not specify a particular curriculum or integration model. As a consequence, this decision process is compatible with a wide variety of approaches to preschool education.

Figure 3. The project Participate Decision Process



PUPIL POPULATION

Service Programs

All but two of the children served by this project were enrolled in the Lincoln Public Schools (LPS). Two children who were involved in the mobility training component of this project lived in Omaha and received mobility training and physical therapy services through Meyer Children's Rehabilitation Institute.

The Lincoln Public Schools serve handicapped individuals from date of diagnosis to age 21 years. All children entering LPS's preschool program receive a multidisciplinary screening. The Child Study Team verifies each handicapping condition. Placement is determined by the child's developmental needs as set forth in his/her IEP. Services include: Homebased Program, Classroom Program, Language and Speech Therapy, Physical and/or Occupational Therapy, Vision, Audiology and Psychology. The classroom programs use peer models to achieve reverse mainstreaming.

The LPS Program for Handicapped Preschoolers provides services to children who have moderate to severe delays in one or more domains of development. Classrooms for preschoolers were distributed geographically throughout the district in elementary schools where the children were grouped cross-categorically. The classroom preschool programs, involved in Project Participate, served approximately 200 children between the ages of 3 and 5 years. Teacher-child ratios were approximately 1:8. The LPS Homebased Program for infants serves children up to the age of 2. Home visits, educational services and supplemental therapies are provided for children and their parents. The LPS Transition Program serves children between the ages of 2 and 3. Daily classes lasting two hours were provided to children in two classrooms. The teacher-pupil ratio for these classes was about 1:5. There is a wide variety of supplementary services available through the Lincoln Public Schools. Occupational and Physical Therapy, Speech and Language Therapy, Vision, Psychology, Audiology and Nursing personnel all provide direct services to children and consultation to staff.

Criteria for Inclusion

The criteria for inclusion in Project Participate required that children a) be five years of age or younger, b) be labeled orthopedically handicapped, and c) have motor disorders that significantly interfered with their ability to participate in their educational programs.

During Year 1 the project identified 15 potential pupils and worked with 10 children, six of whom attended classroom programs and four of whom were enrolled in the homebased program. Year 2's pupil population was composed of 12 pupils, six of whom attended classroom programs and six of whom were in the homebased program. In Year 3, 16 pupils attended the classroom programs and two were in the homebased program. An additional two children living in Omaha, NE, enrolled in the Omaha Public Schools and receiving physical therapy services through Meyer Children's Rehabilitation Institute, also received consultation services from Project Participate because their work with mobility was relevant to our model and expertise.

Characteristics of Students

The population of children for Years 2 and 3 generally displayed lower levels of developmental abilities than pupils in Year 1. Most children displayed several impairments. The ages and disabilities of participating children are presented in Table 1.

Table 1

Distribution of LPS Children by Age and Disability

			Disabilities*				
Age	No. of Children	No. New Children	Orthoped. Impaired	Mentally Retarded	Speech/Lang Delay	Visually Impaired	Hearing Impaired
			Year 1				
0-2	5	5	5	1	0	1	1
2-3	4	4	4	3	2	3	0
3-6	3	3	3	2	2	0	0
			Year 2				
0-2	3	3	3	2	2	0	0
2-3	2	0	2	1	1	2	0
3-6	7	3	7	5	6	5	0
			Year 3				
0-2	1	1	1	0	0	0	0
2-3	6	4	6	2	4	1	0
3-6	11	2	11	8	9	7	0

* Children may have more than one disability.

Pupil Health

Ill health which results in missed days at school and an inability to learn was a frequent problem for many of the children served by Project Participate. Seizures were a significant problem for several pupils. In cases where seizures were comparatively mild, small declines in performance were sometimes noted. However, severe seizures that occurred for extended periods were often associated with drastic declines in performance. In addition, physical problems such as respiratory or ear infections also interfere with the ability to perform. Finally, medical treatment, such as body casts, or medication that produced drowsiness reduced children's involvement at various points.

OBJECTIVES

The objectives of this project included:

1. To develop a decision model for designing adaptive interventions which facilitate active participation by orthopedically handicapped preschoolers.
2. To implement a model demonstration program whose purpose was to enhance child participation.
3. To engage in staff training.
4. To evaluate the project.
5. To engage in dissemination activities.

MODEL FOR ENCOURAGING ACTIVE PARTICIPATION

Decision Model

A decision model was developed during year 1 of Project Participate. Although the selection of intervention strategies involves considerable clinical judgement, the model provides a useful guide to assessment and intervention when there are participation problems. The decision process used in this project previously represented in Figure 3 on page 6 begins with an assessment of the target child's level of participation in each activity area (e.g., entry behaviors, self-help behaviors), included in the child's classroom curriculum or characteristic of the child's homelife. A measure of participation in daily activities was developed and is provided in Appendix A, as Form A. It was used by teaching staff to identify child participation problems. It appears that this measure provided an effective means of selecting pupils for Project Participate.

Results indicate that this measure of participation successfully distinguishes between orthopedically handicapped children who have been selected for inclusion in this project and those who do not have physical impediments to participation. Once participation deficits are observed, attention is turned to identifying the barriers that impede participation. Barriers to participation are organized by developmental capacities - motor, communication, cognitive/learning, sensory/perceptual, and social/personal. The form used by teachers and therapy staff to identify barriers to participation (Form B) also may be found in Appendix A.

At this point, in the application of the decision process, the learner's skills and deficiencies are noted producing a profile of the child's abilities. This knowledge of both strengths and weaknesses is needed for the next step in the decision process - the selection of intervention approaches. Again, steps in the process and strategies, rather than specific measures, were identified in the specification of model procedures so as to insure the applicability of the model across disability categories and classroom and curriculum models. The information needs are specified; staff use their own professional judgement as to how best to obtain the necessary information.

Within this model several broad groups of intervention options are available: (a) increasing a specific skill (e.g., training for improved reach and grasp); (b) identifying an alternative behavior (e.g., using a forearm to draw desired objects closer); (c) modifying the environment (e.g., lowering a tray to permit improved reach and grasp); or (d) adapting an activity in a way that circumvents barriers to active child participation (e.g., providing switches that operate desired objects). The decision to select a particular approach should be made on the basis of an understanding of each learners' characteristics. When option (d) is selected, frequently the other three intervention options are also required for the successful implementation of the adapted activity. For example, before a learner could use an adaptive device such as a computer, an alternative to operation of the device using hands might have to be selected; the learner might have to use a head stick in order to operate a keyboard. In addition, training would be required to teach the child to operate the device. The effectiveness of the strategies identified through the application of the decision process is evaluated by assessing changes in the child's level and quality of participation in classroom and home activities and through changes in performance on IEP objective targeted behaviors.

As a final note, solutions to participation problems are not static. Because children's requirements for compensatory strategies may change as they acquire new skills and enter new environments, it is often necessary to modify approaches to enhancing child participation. In general, compensatory strategies for elementary school activities involve adaptations that permit participation in activities that are more complex and academically sophisticated than are typical for preschool activities. Ideally, participation goals are addressed before deficits arise. This is particularly important when preparing preschoolers in the use of assistive devices that will be needed if they are to engage in elementary school level academic activities. For example, handicapped kindergartners are better able to achieve at grade level when, as preschoolers, they were equipped with and learned to use the assistive devices that help them engage in the academic activities presented in kindergarten.

Planning Interventions

The goal of intervention is to increase active child participation in educationally meaningful activities. Project Participate's decision process assists staff in identifying barriers to child participation. Restricted participation interferes with many learner activities. Children who have impaired communication skills are frequently unable to make requests, or indicate choices to teachers and peers. Similarly, children whose mobility is severely limited, as with cerebral palsy, are generally unable to actively participate in common preschool activities. Too often these pupils are passive participants who are moved by others and whose choices are made by adults. To combat the tendency for these children to be only physically present in their programs, the Participant Decision Process emphasizes strategies for promoting active involvement.

Implementation of the model involved addressing children's participation goals using the following steps:

1. Educational staff members document a child's participation deficits using Form A (see Appendix A) which is organized to reflect daily preschool activities.

2. Educational staff members contact child's parents and obtain their consent for entry into Project Participate.

3. Educational staff members or coordinator contact team members and have them identify barriers affecting participation using Form B (see Appendix A).

4. Interdisciplinary team members assess child, on referral, using criterion referenced and observational measures. Selection of specific measures depend on learner characteristics identified in steps 1 & 3.

5. Interdisciplinary team meetings are held using the worksheets presented in figures 4 and 6.

During the staffing, decisions were made regarding children's activities. Activities that did not make a meaningful contribution to a task or that did not promote the development of additional skills were not targeted for intervention. Activities are judged educationally important (e.g., Brown, Nietupski & Hamre-Nietupski, 1976; Robinson, 1976) if:

1. The activity provides the opportunity for the learning of skills which will enable the child to engage in a functional or social task or to acquire more sophisticated abilities.

2. The pupil's performance of an activity would make a useful contribution to the completion of an overall task that was socially or developmentally meaningful.

Interdisciplinary team

The interdisciplinary team is an essential component of Project Participate. Because of the complexity of the problems displayed by the learners served by this project, professionals from several disciplines were invariably involved in their educational programs. Typically these pupils were served by one teacher, three to four therapists and several aides. Children's teams were composed of those therapists and teachers already working with the child plus Project Participate staff. Teams frequently included a physical therapist, an occupational therapist, a speech pathologist, the pupil's teacher, a vision specialist and one or more project staff members.

Coordination of the efforts of these professionals was essential to the success of any efforts to increase child participation. Successful coordination of activities and implementation of procedures depends on everyone knowing how each child was being worked with in order to ensure consistency among adults working with the pupil and the effective implementation of the program as planned. However, despite the desire of most parents and teachers to obtain input from all disciplines assessing and providing services for their child, it is often difficult to incorporate the multiple sets of goals, objectives and intervention strategies presented by the various disciplines into a child's program. In many settings, therapists have little interaction with each other and, consequently, have difficulty presenting complimentary and cohesive plans to both parents and teachers. Failures of coordination among staff produce delays and difficulties in implementation of interventions.

Obstacles to coordinated team functioning have several causes. First, it can be difficult to obtain agreement from staff representing diverse disciplines. It is common for staff who do not share the same professional backgrounds to emphasize different objectives. For example, educational and physical therapy staff may differ on how much a child's trunk should be supported. Educators may wish to provide substantial support so the pupil will have optimal hand use in order to manipulate toys; therapists may want the child to have little trunk support so the child will have to practice trunk control. It is through collaboration within a team that diverse and even competing goals are reviewed and integrated. Systems for designing and implementing integrated intervention plans for children and families need to be developed. The use of a problem solving process by an interdisciplinary team facilitates the design of integrated goals and strategies to be incorporated into school and home routines of daily living. The Participation Decision Process already presented in Figure 3 provides such a framework for integrating goals and objectives by focusing on child participation in the curriculum.

Once the Interdisciplinary Team and classroom staff identified the barriers that limited a student's participation in activities, efforts were directed at determining what interventions could be expected to overcome the effects of these barriers. Intervention strategies were identified during the staffing and were implemented by teachers with consultation from the project staff. In general, options that increase both a child's level of independence and competence were considered first. Strategies that required extensive dependence on others, on specialized equipment, or that circumvent opportunities to learn useful skills were tried only when direct approaches to increased independence and competence were not feasible. For example, powered mobility would be offered when learners were unlikely to be functionally mobile using such simpler and more direct alternatives as walking with a walker.

Intervention Strategies

The Participation Decision Process specifies four major strategies for overcoming barriers to active participation.

Increasing Specific Skills. This is typically the first option to consider. By teaching a child to perform those skills that are currently barriers to performance of the activity, the child will be able to be more independent and competent. This increased competence will then lead to increased independence in performing other activities as well.

This option is contraindicated if the child cannot learn the skill due to presenting handicapping conditions. It is also possible that the skill may take an excessively long time to learn. In such a case, another intervention may be selected either as a permanent or temporary alternative.

Alternative Behaviors. This option involves having the child use an alternate behavior within the child's repertoire to perform the activity. For example, a child who cannot say "hi" to greet a person may be able to use waving as an alternative.

Alternate behaviors may be useful to the degree that they are functionally similar to the original target behaviors. They may be able to serve as long-term substitutes or short-term alternatives to be faded after the original target behavior is learned.

While alternative behaviors may be functional, some may be unacceptable in certain contexts, such as where the available alternative is particularly stigmatizing.

Environmental Modification. Environments may need to be modified to increase a child's performance of a skill. There are two reasons for deciding to modify the environment. First, the environment may be unsuitable for the activity in general. For example, if an activity is to be performed at a table and the child is seated too low to use his or her arms atop the table, a modification should be made of the seat and/or table. Second, the environment may be unsuitable due to unique characteristics of the child. For example, the child may have a visual problem that precludes focusing on an activity on a table. Presenting the activity on a vertical plane with the use of a typewriter stand may circumvent the visual problem. Lastly, an environmental modification to increase social interaction might involve placing materials on the tray of a child's wheelchair. In so doing, children may be more likely to approach the child whose mobility is limited.

Adapting the Activity. Activities can be adapted in order to circumvent barriers that restrict a child's involvement in them. Unlike the other options, an adaptation of an activity involves changing the materials, the task, or rules governing that activity. Often multiple adaptations are made to a single activity. Selection of one or several adaptations must be based on a review of the skills of the child and the requirements of the adapted response. Adaptation of an activity is indicated when the child's skill level is extremely discrepant from the skill requirements of the activity. Depending on the nature of the discrepancy, the adaptation may serve as a permanent solution or an interim solution to be used in tandem with one or several other options. After an adaptation has been selected, several questions must be considered: a) Does successful performance of the adapted activity require alternative behaviors?, b) Does successful performance of this adaptation by the child require modification of the environment?, and c) What will the child need to be taught in order to use the adaptation?

Adaptation of an activity is contraindicated when it will unduly stigmatize a child and when an alternative is available. It is also a questionable choice where the adaptation may reduce a child's motivation to perform without the adaptation where this is feasible. An adaptation may also be provided to prepare a child to use the adaptation at a later date when it will have become necessary for successful involvement in educational activities.

Implementation of Interventions

Improvements in child participation are obtained as programs and learners achieve greater compatibility. Successful interventions to increase program - child compatibility and, thus, child participation, are very demanding of professional staff. Teachers need to have adequate knowledge and sufficient time to implement the intervention as well as to prepare the materials required by the intervention. For example, some children who are unable to make choices verbally may be able to make a selection by pointing to photographs depicting the alternatives available to them. To implement this procedure, teachers must know about the child's abilities to recognize photographic representations of choices and to indicate choices by pointing. Time and materials are also needed for the preparation of the photographs and to allow the teacher to familiarize the child with this system for indicating choices. Finally, teachers need to know how to utilize these adaptations in classrooms so that learners are integrated into classroom activities as active participants. Project Participate assisted teachers' efforts to implement interventions by providing knowledge through individualized consultation and inservice training, by providing assistance with the preparation of materials and by providing help with putting interventions into use.

The progress of an intervention was monitored on a regular basis by the project coordinator. Beginning one month after the staffing, the coordinator contacted each teacher to determine which interventions were being implemented. During these contacts, the extent to which the intervention was working was assessed, reports of increases of child participation were noted, and problems associated with the intervention considered. At these times, reports of teacher satisfaction with the intervention were obtained. Where teachers reported problems with the intervention, the coordinator arranged consultation with a project staff member. Once interventions were successfully implemented, monitoring was reduced to monthly telephone contacts. Also, at this time additional activities in which participation was low were identified and, if desired, the project's team provided assistance in devising strategies to eliminate these additional participation deficits.

Technology - Simple and Complex Applications

Project Participate made use of both "high" and "low" technology. The needs of individual children, rather than preconceptions regarding the application of technology, determined the type and sophistication of the devices that were used. In general, the least complex technology that was appropriate for an application was used. The emphasis on avoiding "high tech" when "low tech" solutions were available is based on the knowledge that "high tech" is generally more costly and less available than simple technology and because the use of "high tech" solutions often requires more staff training than do "low tech" solutions.

Promoting Play with Preschool Materials

Preschoolers spend much of their time playing with toys that represent, in miniature, objects found in daily life. The ability to play with these materials is thought to aid in the development of eye-hand coordination and prewriting skills. In addition to play with toys, preschoolers also invest considerable energy learning to represent their world through drawing and by using blocks to create constructions. Opportunities to draw and build are essential to the development of a broad range of skills. These materials - toys, implements for drawing and building - are made to be manipulated by hands. Consequently, learners whose motor disorders impair their hand use have limited access to these materials. Compensatory strategies may be required if these children are to be able to use these objects conventionally (Campbell, Green & Carlson, 1977; Musselwhite, 1986). To play with objects and to draw in a normal fashion, children typically must be able to: (1) balance themselves without the use of their hands; (2) voluntarily grasp and release an object; (3) use their hands in a lead/assist fashion; (4) interact with the environment in a constructive fashion; and (5) coordinate the use of their eyes and hands (Klein, 1982).

Adaptations of classroom materials have come into increasingly wide-spread use to enhance the ability of preschoolers, who have motor disorders, to manipulate playthings and to actively engage in learning activities. These adaptations are designed to circumvent the effects of motor disorders and are quite varied depending mainly on the creativity of educators and parents to devise them. Project Participate addressed problems associated with limited access to preschool materials through the use of skill training, alternative behaviors, environmental modifications and adaptations of materials and activities. For each child, various compensatory strategies were evaluated in order to identify procedures that successfully facilitated the ability of the children to play with preschool materials. A sample worksheet illustrating these strategies and procedures is presented in Figure 4.

To expand child access, playthings were often modified. Some modifications require changing the shape or size of the object to facilitate grasping and manipulation. For example, crayons are available in various sizes and shapes that facilitate grasping. Many times, however, access is increased by modifying the environment rather than the plaything itself. Environmental modifications that can increase access to activities involve changes in the learning environment. Stabilizing materials to prevent them from falling or sliding out of reach is a common environmental modification (Schaeffer, 1988). Specific modifications have included fixing the item's

Figure 4. Activity center intervention worksheet

Name: Date:

Activity: Center Activity

Components of Activity: Drawing

Purposes of Activity for this Child: Pre-school Academic Skill

Barrier(s) Identified: Poor hand use

Intervention Options	Relevant Child Characteristics	Priorities of Options
1. Increase specific skill. Specify potential instruction: a. Have occupational therapy continue to work on this b.	Child has immature hand grasp	Continue therapy
2. Compensatory skill. Specify potential compensation(s). a. Use whole hand grasp of crayon b. Use raking motion to pick up crayons	Can open and close hand but cannot use a pincer grasp	Allow child to use whole-hand grasp until splints are in place
3. Environmental modification. Specify potential modification(s). a. Reposition child/reduce height of table use hand splints to put finger & thumb in opposition b. Tape paper down	Childs stays on task for several seconds and then becomes frustrated	Immediately
4. Activity adaptation. Specify potential adaptation(s). a. Put bead in middle of crayon b. Use bulb-ended crayons	Can maintain immature hand grasps	Immediately

position (e.g., clamping an object to a work surface), restricting the movement of materials (e.g., dampening movement with Dysam, which retards sliding), magnetizing materials so they tend to be held by a metal work surface and by placing a ridge around the periphery of a section of a work surface to restrict the area within which an object can move. Environmental modifications can also be used to expand the variety of playthings one child could obtain. For example, materials can be placed on a Lazy Susan, enabling a child to reach more items than were previously accessible. Toy frames (see Appendix E) can also provide expanded access to playthings (Musselwhite, 1986). Other environmental modifications involve modifying the work surface the learner uses by adjusting the height of the work surface to facilitate manipulation of playthings.

Adaptations of activities also involved changing the means of engaging in an activity. Such adaptations vary considerably in complexity and generally involve modifications of playthings. Increasing access to a toy or device often involves little more than the use of electric switches to make the operation of a device accessible to an individual who could not previously operate it. More complex adaptations may involve the use of microcomputers to provide control over more devices or permit learners to use switches to engage in more interesting and useful activities. The components of a motor access evaluation are illustrated in Table 2. The number of children who used the various adapted play materials is depicted in Figure 5.

<u>Increasing Access with Switches</u>

With increasing frequency, adaptive devices are being used to provide multiply handicapped children with the means to exercise control over environmental events. An essential component of many adaptations is a switch. The use of switches to assist handicapped children is now widely recommended (e.g., Musselwhite, 1986; York, Neitupski, Hamre & Nietupski, 1985). Many variables can influence switch use by a learner including motivation, motor abilities, and cognitive ability. When no handicapping condition is present, children develop the skills needed to operate switches in infancy.

Nonhandicapped infants under six months of age learn discrete responses (e.g., head turns, foot kicks) in situations where these responses produce an interesting event (e.g., Finkelstein & Ramey, 1977). Infants and children who are handicapped display a similar ability to learn simple cause-and-effect relationships and to use switches to produce interesting displays (Brinker & Lewis, 1982; Robinson, 1976; Robinson & Robinson 1978; Zuromski, Smith, & Brown, 1977) as do adults and teenagers who are profoundly retarded and have cerebral palsy (Realon, Favell, & Dayvault, 1988).

The success of a "switch program" is dependent upon the properties of the switches used. Switches vary in design, cost, and reliability (Burkhart, 1981; Wethered, 1982). It is important to match the switch to the child's abilities. Several guidelines are helpful in making a selection (see Appendix E, Selection of a Switch). Most important, the switch must reliably respond to the child's efforts to operate it. This means that the same motor

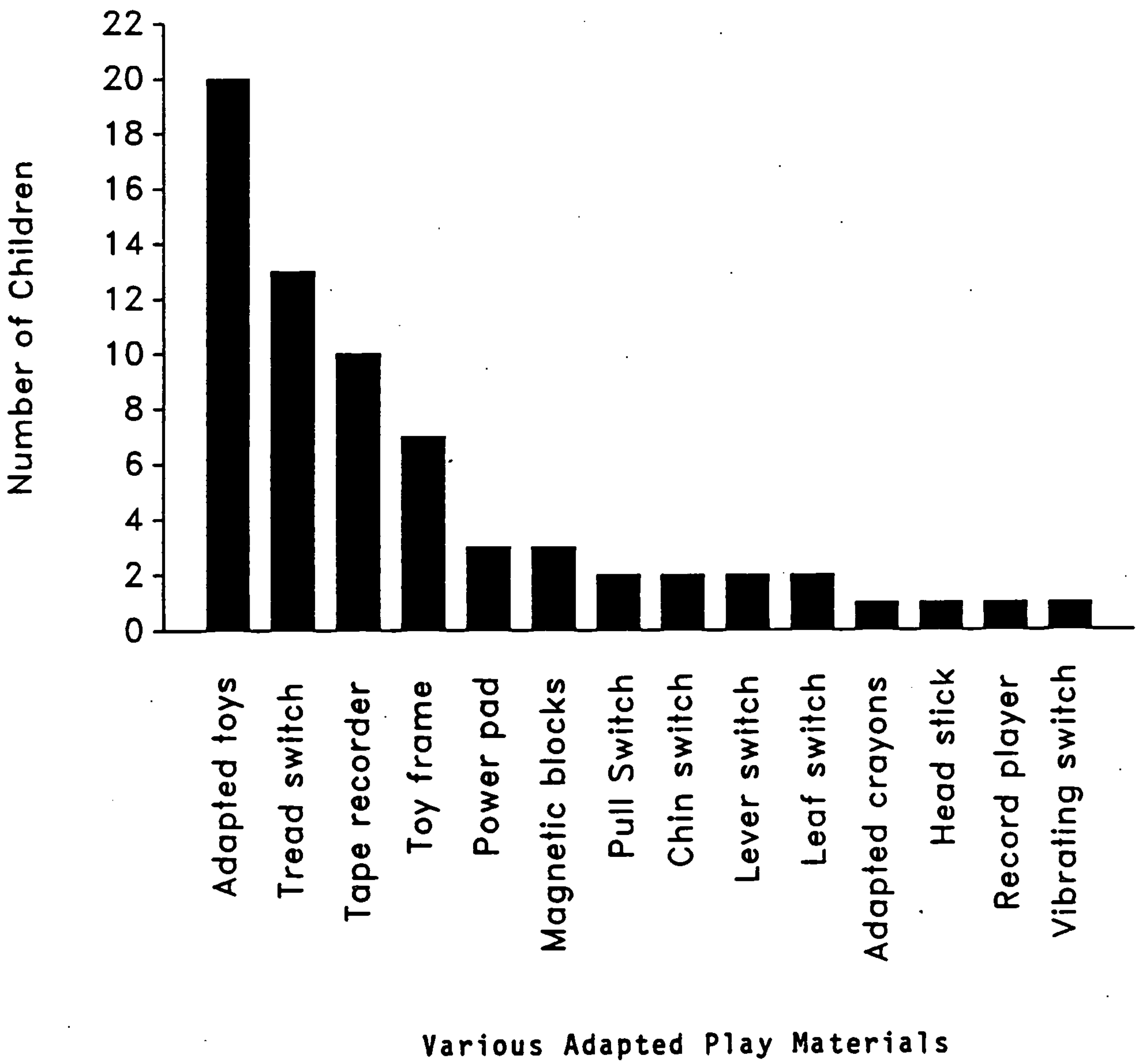
Table 2

Illustrative Motor Access Evaluation

Name: Evaluator:
Date:

Activity	Position	Positioning Equipment	Tone	Stability	Visual Access
1)Switch Use Type:Pressure Mode:Hand Skill:Reach, Press, Release	Sitting	Wheelchair and tray	Fluctuates	Head Falls Forward	Can't see switch, toys or hand
	Standing	Stander	Stiff	Head Falls Forward	Can't see switch, toys or hand
	Sideling	Sideling	Stable, Moderate	Good	Good
2)Object Play Type:Fisher Price Toys Mode:Hand Skill:Pincer Grasp, Release	Sitting	Wheelchair and tray	Fluctuates	Head Falls Forward	Can't see switch, toys or hand
	Standing	Stander	Stiff	Head Falls Forward	Can't see switch, toys or hand
	Sideling	Sideling	Stable, Moderate	Good	Good

Figure 5. Numbers of children using adapted play materials



response should be able to operate the switch each time it is made by the child, and of course, that the switch does not operate by itself in the absence of that response. The switch must permit children to make use of their most reliable motor responses. It should also be sensitive; that is, it should be activated by relatively low levels of force extended over short distances. In addition, a switch needs to be durable in order to withstand occasional rough handling by children. Where possible, switches that provide secondary feedback should be used because such switches have an advantage over ones that provide none. This feedback is often a sound, usually a click, a rough surface for tactile sensation, and an observable movement.

Individualizing switch interventions. All interventions, including those using switches, need to be adjusted to the characteristics of each learner. Facilitating the performance of motor skills requires the positioning of the child, and the materials that child is to use, as well as the selection of both a motor response and a consequence. Guidelines for facilitating motor skills are also included in Appendix B.

Positioning the child. It is characteristic for children with cerebral palsy to have difficulty reaching out and activating a switch. Often, their ability to balance themselves is impaired, as is the use of their hands. As a consequence, work with these pupils often begins with positioning them in ways that facilitate eye-hand coordination and good head and trunk control so they need not expend much effort balancing themselves (see example in Table 2). Most of the children operated the equipment while seated. When properly seated, a child's trunk is supported and stable while the child's voluntary movements are minimally impeded. Generally, such stability is best accomplished when the child's seat and back rest securely against the chair, and the child's feet rest squarely on the floor or on a foot rest. When needed, additional support can also be given to the child's head and trunk. Positioning guidelines may be found in Appendix B.

Responses. When a child's motor abilities are impaired, it becomes important to identify the child's most effective motor responses. These may be foot presses, hand sweeps, chin movements, or any other motor responses that could conceivably be used to operate a switch. In addition to control of a motor pattern, it is also important to consider the force a child can exert and the child's endurance when exercising that motor skill.

Positioning of switch. After a child has been properly positioned, a reliable motor response identified, and a switch selected, it is very important to place the switch where it is most readily accessible to the child. Positioning switches in a manner that facilitates the desired motor responses may involve mounting the switch directly to a work surface, such as a table, a wheelchair tray or slant board. It may be necessary to place a switch under a child's chin or foot - whatever is required for optimal responding. Switches can be mounted onto boards that are then clamped to the child's table or chair.

The selection, modification and placement of switches is very important. Failures to correctly position materials can result in difficulties for children. To facilitate correct positioning of both child and materials, photographs of satisfactory arrangements of child and materials can be used to ensure that all staff are aware of the child's positioning needs. Guidelines regarding positioning of materials are included in Appendix B.

Consequences. A substantial number of different events can and should be used as consequences to be produced through the use of a switch. We have generally used a ratio of one response to one consequence with the children. Learners show preferences among events (Wacker, Berg, Wiggins, Muldoon & Cavanaugh, 1985). To some extent, their preferences may be accounted for on the basis of their sensory abilities or disabilities. But beyond this, it seems likely that the child's recognition that he is controlling an event is as important as the consequence itself (Watson, 1966).

Children can become bored both with the displays they produce and with the switch task itself. When performance declines, interest can often be increased by changing the consequences. However, it is possible to reach a point where changes in consequences are insufficient - a point at which the task itself is no longer exciting. At such a point, it is more useful to change the task in a major way or eliminate it from the child's schedule rather than continue to search for interesting consequences in the hope of maintaining the child's performance. Often little is gained by maintaining a pupil on an activity that has been learned and practiced, as is the case when children are provided simple switch tasks that are continued with little modification for extended periods.

Social Interaction

Increasing participation in social interactions was also a goal of intervention. Guidelines for increasing social interaction are included in Appendix B. Project Participate utilized several approaches to increasing social involvement. A variety of simple environmental modifications can be used to promote social interaction between pupils and their peers. For example, placing desirable toys and objects with a pupil will tend to attract peers to that child. On several occasions, project staff provided youngsters with a switch operated toy that attracted peers who observed and sought turns with the toy. Children can also be encouraged to take turns activating a toy - the switch being passed between them. When this activity is used with severely handicapped pupils, we have found that after several sessions the children seemed more aware of each other. At first their awareness appeared to be limited to the hands of the other child but later an expanded awareness of each other developed. Another approach to increasing social interaction makes use of a turn-taking task generated by a microcomputer. In this activity, two pupils take turns operating switches to move an electric train between them. This activity has been mastered both by preschoolers who have mild cognitive delays and severe motor disorders and by severely retarded, school aged children (Keefe, Rosenberg, Boyd, & Hutinger, 1988).

Computer group activity. Computer based adaptations of activities can be successfully used by handicapped preschoolers and their classmates. Songs are particularly good candidates for adaptation. During songs, pupils may be allowed to choose the verses of a song to sing. A child with oral/motor problems is often unable to verbally select a verse or may be misunderstood by his/her peers. With the help of an Apple IIe, a voice synthesizer, and a Power Pad, such a child could make his/her selection known to peers. The Wheels on the Bus and Morning Song are examples of songs that have been adapted for the computer. The software for these songs has been developed by the Intervention Program for Handicapped Children at UCLA.

The introduction of a group computer activity is exciting to everyone involved. Often, the teacher will ask a pupil to pick a verse of a song and then all other children sing that verse. The Power Pad is passed around and each child is able to begin the verse by pressing the appropriate picture. The computer will then begin to sing the selected verse and the children will typically sing along. Use of the power pad in this way enables the handicapped child to select verses in the same manner as his/her peers.

Mobility

Disorders that restrict children's ability to initiate movement may retard perceptual development, may decrease mastery motivation, as well as limit the experience of self-control and exploration that comes with locomotion (Campos, Svejda, Campos, & Bertenthal, 1982). Recent studies with nonhandicapped infants and toddlers indicate a strong relationship between locomotor experience and emotional, social and cognitive development. Locomotor experience is associated with the onset of wariness of heights (Bertenthal, Campos, & Barrett, 1984); with increased interest in social stimuli (Gustafson, 1984) and with success in object search tasks (Kermoian & Campos, 1988). Mobility experience appears to foster an understanding of the position of the world relative to one's own body by providing opportunities to control events through movement and by contributing to a practical action-based knowledge of object and self relations in space (Benson & Uzgiris, 1985; Campos et al, 1982). Self-produced movement may also be important to the ability to calibrate distances between one's own body and outside objects (Campos et al, 1982).

The use of various devices to facilitate the mobility of children who have motor disorders such as cerebral palsy and spina bifida has begun to attract considerable attention (e.g,. Butler, 1986; Butler, Okamota & McKay, 1984; Trefler, 1986). These devices fall within two broad groupings - powered and nonpowered mobility aids. The effects of providing children with mobility aids are not well known. Evidence from work by Kermoian & Campos (1988) demonstrates that the experience of walker assisted mobility facilitated the search skills of normally developing, prelocomotor infants. Only a few studies involving the use of powered mobility with young children who have severe motor disorders are available (Butler, 1986; Verburg, Field, & Jarvis, 1987). Butler (1986) studied the effects of powered mobility on six children, aged 2 to 3 years. Her study showed that all of these children were able to master the use of a powered wheelchair. Furthermore, she observed increases in self-initiated movements, interactions with objects, and communications to caregivers for three of her six subjects.

Electrically powered wheelchairs give users greater speed of movement and power for traveling up inclines and over rough surfaces than do manual wheelchairs. The electric wheelchair requires less strength and less sophisticated motor skills than do manual chairs. Finally, electric wheelchairs can be operated using a larger number of possible modalities than manual chairs - including operation by a single hand or with a head stick. However, electric wheelchairs are not without some disadvantages. Electric mobility is far more costly than manual mobility aids. Electric wheelchairs require more maintenance, can cause more damage when improperly operated. Manual chairs provide users with greater opportunities for developing upper body strength than do powered chairs. Finally, manual chairs are generally more portable than are electric wheelchairs.

Subjects. Six children aged from 2 to 5 years were involved in mobility activities within Project Participate. All six had orthopedic handicaps that substantially limited their ability to voluntarily move around their environment without assistance. These children's handicapping conditions are presented in Table 3. Each subject was verified as having severely impaired mobility skills due to a motor disorder by members of the Lincoln Public Schools PT/OT staff or by PT staff from Meyer Children's Rehabilitation Institute.

Table 3

Characteristics of Children Participating in Mobility Intervention

Child	Age	Sex	Condition	Intervention
1	4	F	SP, OH	Electric Cart
2	3	M	SP, OH, MR	Elec. Cart, Ultra.
3	3	F	SP, OH, MR	Ultralight
4	2	M	SP, OH	Electric Cart
5	2	F	OH	Electric wheelchair
6	5	F	OH, MR	Electric wheelchair

SP - Speech, OH - Orthopedically Handicapped, MR - Mentally Retarded

Adaptations. Where children were found to experience problems with seating or with access to wheelchair controls, occupational and physical therapy staff adapted the wheelchairs to facilitate child use as recommended by Enders (1984) and Hulme, Gallacher, Walsh, Niesen & Waldron (1987).

Procedures. Physical and occupational therapy staff trained the children in the use of these mobility aids. The two children who received experience with the electric wheelchair received physical therapy services through Meyer Children's Rehabilitation Institute in Omaha, Nebraska and were not enrolled with LPS. Each child's mobility was substantially impaired as a result of cerebral palsy. Children's unassisted mobility was limited to rolling and commando crawling with difficulty. Providing children with powered mobility involved: (1) adjusting the mobility device to the child's characteristics in order to optimize each child's ability to operate the vehicle; (2) familiarizing the child with the vehicle and providing experience with self-produced locomotion; (3) assisting the child in refining the ability to use the mobility aid and to engage in goal directed locomotion.

In each case, modifications of the mobility aids were needed before children could effectively operate their vehicles. Each child's seating had to be customized in order to provide a stable position from which to operate the controls. The controls of these devices also had to be modified to provide children access to them. The cart, which was initially operated with a joystick, was modified to permit use of a set of four switches for controlling the directions of movement. The electric wheelchair's joystick control was moved from the outside to the inside of the armrest in order to place it within reach of a two year old girl. The movement of the electric cart and electric wheelchair startled some of the children. This was a particular problem with the cart because it started abruptly. This was less a problem with the wheelchair because its rate of acceleration was more gradual. To minimize startles and fearful reactions, children were introduced gradually to their vehicles. Initially children were allowed to sit in their vehicles while the vehicle was not under power. When the children were comfortable with the devices, they were encouraged to begin to operate their mobility aids. Initially they were allowed to play with the controls under adult supervision. As they achieved greater skill, they were given verbal directives to move to a goal. This instruction was given in the context of the children moving themselves to a goal - typically a plaything or person. At this point most children were given verbal directives and were physically guided in the operation of the controls. Children practiced going forward, backward and turning. Two children were also provided light-weight pediatric wheelchairs through LPS's therapy staff. As with powered mobility, the chairs were adjusted to fit the pupils and children were encouraged to propel themselves to goals, including other groups of children.

Frequency and duration of training sessions varied somewhat from child to child and between the LPS and MCRI programs. The electric wheelchair training sessions ranged from 10-40 minutes in length depending on the availability of staff and the child's motivation and endurance. Training sessions occurred 3-4 times each week. Less instruction was available for the electric cart and manual wheelchairs, about 10 - 20 minutes during 1 - 2 sessions each week.

A good example of a systematic training program was provided to a five year old. Her training in the use of a powered chair began with orientation to the relationship of joystick movement to activation of the wheelchair. Verbal and physical prompts, as well as physical guidance, were used to encourage the child to direct the chair's movement. Following orientation to the operation of the chair, the child was asked to operate the chair in an open area. During these sessions she was asked to come to her therapist or to retrieve a desired object. Operation of the chair in an open area allowed her to practice self-correction of errors in direction without risk of injury or damage to the chair or her surroundings. Next, training activities involved placing a single obstacle in the child's path. This activity helped to develop the motor planning skills needed to operate the chair in environments that contain many objects and obstacles. These activities progress to training on an obstacle course which routinely involves driving the chair around closely spaced markers in a slalom pattern and operating the wheelchair in narrow spaces, turning, entering doorways, and orienting the chair to tables or bedsides to facilitate transfers.

Children made clear progress using the electrically powered devices. One child went from use of the cart to functionally using an electric wheelchair; another child was provided her own Ultralight manual chair after having used an electric wheelchair for several months. Reports from her therapist indicate she has made an excellent adjustment to the manual chair. Another child who had a manual chair never learned to use it functionally. She used it to travel short distances and only when directed by an adult.

The use of powered mobility permits the resolution of a variety of problems including: 1) using a joystick to permit control of a powered wheelchair in order to compensate for the inability to operate a manual wheelchair due to severe involvement of an arm rendering it ineffective for pushing a manual wheelchair; 2) enhancing child motivation through the use of powered mobility which provides each child with an immediate and more recognizable experience of movement than do manual mobility devices; 3) providing experience with directionality and expanded opportunities for perceptual-motor learning. Children enjoyed the powered mobility aids. One child called the electric wheelchair her "bike". A child who initially was provided with an Ultralight manual wheelchair and later also given access to the electrically powered cart demonstrated greater mobility with the electric cart than his manual chair. In general, these children seemed to derive greater enjoyment from powered mobility than from the manual devices. Although some were initially fearful of the powered mobility aids, all children who had access to powered mobility eventually overcame those fears.

In the course of this work, several prerequisites for effective use of powered mobility aids were identified, including (a) understanding of cause and effect relationships (Uzgiris & Hunt, 1975); (b) use of strategies for obtaining objects and materials from their surroundings (e.g., pointing, reaching, vocalizing); and (c) sufficient vision to permit children to see objects out of reach and, of course, to see where they are moving.

Communication

Young children who cannot speak or convey their messages by other natural means are being helped to communicate through the use of augmentative communication systems (e.g., Rosenberg, Buekelman, Clark, & Filer, 1987; Rosenberg, Clark & Filer, 1988). Some of these children are unable to produce sound, while others can only be understood by persons very familiar with them. Although a variety of conditions can produce an inability to speak, the work reported here focused on children whose inability to speak stems primarily from motor disorders. Cerebral-palsy is the most common motor disorder that impairs oral-motor functioning and with it the ability to speak. There is little doubt that impairment of the ability to speak greatly impedes children's ability to communicate. Several studies of nonspeaking, physically disabled individuals and their partners have found that interactions are characterized by highly routinized exchanges, such as question and answer routines where a speaking partner contributes a large portion of yes/no questions and the nonspeaking person responds with the information requested, often using a simple communication device. Most research has looked at adults and older children. Observations of nonspeaking, physically disabled preschool children suggest they are able to produce only a restricted range of communications and have limited control over conversations (Light, Collier, & Parnes, 1985a, 1985b). The importance of providing young nonspeakers with communication aids is made clear by the finding that nonspeakers fitted with communication aids before adulthood make more use of their aids than do individuals who received aids as adults (Culp, Ambrosi, Berniger & Mitchell, 1986).

An important area of research has been the way different types of augmentative communication systems affect the ability of nonspeaking individuals to contribute to conversations (Beukelman & Yorkston, 1980). Approaches to augmentative communication make use of both electronic and nonelectronic aids (Fairweather, Haun & Finkle, 1983; Goosens & Crain, 1987; Musselwhite & St. Louis, 1982). A case study of a young adult suggests that electronic communication aids offer greater flexibility to communicate more quickly in a greater variety of situations than do either no aid or a nonelectric communication device (Trefler & Crislip, 1985). The use of augmentative communication aids has raised concerns that children will not develop speech if offered augmentative communication. This issue has not received extensive study. Experience suggests that children and adults who have augmentative systems continue to have an incentive to speak directly in situations where they are understood (Smith-Lewis & Ford, 1985).

Currently, few empirical studies on the use of augmentative communication devices by young children are available. One study indicates that children learn to use communication devices but may not make frequent use of this equipment when communicating with their parents and are frequently unable to initiate topics for discussion (Light et al., 1985a). Most of the work indicating low use of communication aids (e.g., Light et al., 1985a) studied children who were using nonelectric devices. In view of Trefler's and Crislip's (1985) finding regarding the advantages of electronic aids over nonelectric devices, it is important to compare the impact of these types of communication aids on children's communications. Studies describing how to train nonspeaking children to use augmentative communication systems are also infrequent. One study indicates that children can be successfully trained to increase their use of augmentative systems and to be more effective communicators (Glennen & Calculator, 1985). Together, this work suggests the importance of looking at children's capacity to communicate on both electronic and nonelectric communication devices after providing training designed to encourage the use of augmentative communication systems.

The different augmentative communication devices have various advantages and disadvantages. Nonelectric communication devices can be powerful yet relatively inexpensive. Nonelectric aids are usually quite portable and can be operated (in the case of eye gaze) by individuals who have extremely limited motor skills and who would be unable to operate most other kinds of augmentative systems. Electronic communication devices appear to have a number of advantages over nonelectric communication boards. Most important is the ability to produce synthesized speech. By producing speech, a child is able to communicate with people who are not at the child's side. It also allows the child to call for attention and lets other children know that the child user is a potential communicator. Because it produces speech that can be understood at a distance, it creates opportunities for larger numbers of adults and children to enter into communication exchanges involving the child user. However, these devices have a major disadvantage - their substantial cost. A discussion of the characteristics of electronic augmentative communication systems may be found in Hooper and Hasselbring (1985). Goosens and Crain (1987) provide excellent discussions of a variety of nonelectric communication devices. Guidelines for the development of communication systems are included in Appendix B.

Subjects. Five children, age range 2-4 years, were involved in communication interventions. Each child had an orthopedic handicap that substantially limited the ability to communicate. Children were diagnosed as having cerebral palsy as well as displaying some degree of cognitive delay. Characteristics of these children and the type of communication device each used are presented in Table 4. Each subject was verified by LPS therapists displaying severely impaired communication skills because of a motor disorder.

Table 4

Characteristics of Children Participating in Communication Interventions

Child	Age	Sex	Verification	Intervention/Equipment
1	4	F	SP, OH	Apple IIe*, Call Button, Touch Talker
2	4	F	MR, OH	Choice Box, Picture System, Signing
3	3	M	SP, OH, MR	Touch Talker, Picture System, Apple IIe*
4	2	F	SP, OH	Call System, Amplified Speech
5	4	M	SP, OH	Apple IIe*, Picture System

* Apple IIe was used with a Unicorn board, Adaptive Firmwear card or a Power Pad

Equipment. Equipment for this work included both electric and non-electric devices including the Touch Talker, a battery powered, augmentative communication device manufactured by Prentke Romich. The Touch Talker produces synthesized words and phrases that have been programmed into it. The Touch Talker was selected for use because it is portable and is in wide use. Synthetic speech was also produced using an Apple IIe.

Project staff were responsible for facilitating child access to the communication devices. Where children were found to experience problems with access or the operation of the controls on the communication device, project therapy staff made adaptations to facilitate child use (Hulme et al, 1987).

An important aspect of social interaction is the ability to make choices and communicate them to others. Several of the pupils in Project Participate were unable to participate in making choices due to their inability to communicate them. Several problems contributed to this limitation. Some children were able to make choices but were unable to communicate them because of motor impediments to verbalization. Other children were unable to make choices because verbal information alone was not sufficient to allow them to choose among alternatives. A choice box (see Appendix E), a non-electronic assistive device, may be useful in this situation. It may be constructed of different materials, but should allow the child to visually scan the choices until a decision has been reached.

When setting up a choice box for a child a teacher must consider the number of choices that the pupil is able to handle. The pupil should begin with two choices. These choices should be real and meaningful to the pupil, such as the activity in which they choose to participate. Choices should not be given that are not true options for the student. The level of symbolization of the items to be communicated must be selected (see Appendix B, Communication System). Once a child is able to use the choice box functionally, this system may be linked with "tickets to locations" by allowing the child to make a selection and then having the child take the object, or picture representing the choice, the "ticket", to the activity selected.

Interventions. Observations of children's communications were made during snack, play, as well as classroom activities. These observations were noted and examined. Clinical judgement in the context of the Participate Decision Process was used in deciding the type of intervention (see Figure 6).

Communication training was guided by the premise that communication requires the ability and willingness to engage in give-and-take exchanges (MacDonald & Gillette, 1986). Nonspeaking children were also taught using a combination of modeling, imitation, and structured communication events (Hart & Rogers-Warren, 1978) and expectant delay (Halle, Baer & Spradlin, 1981).

Children were trained in the use of augmentative communication devices. This involved two steps: 1) familiarizing children with the mechanics of operating each device and 2) training them to use the device to become active communicators in their daily lives. Training in the use of augmentative devices often occurred in the context of playful social interactions, games, in which the structure of the activity allowed all child responses to be correct and to call for playful adult reactions. In this way, children were drawn into enjoyable exchanges that provided essential experience with augmentative devices. This approach was used to introduce both electric and nonelectric augmentative devices. Introducing children to augmentation in this way proved to be useful even when children displayed basic communication and turn taking skills prior to the introduction of augmentation. Frequently used games included Simon Says and play with a Dressy Bessy Doll. In both activities, the child used a communication device to direct the actions of the adult trainer. As training progressed, children were encouraged to use communication aides to make requests in less structured situations. Occasions that offered opportunities for communication included snack time - when children would typically request food items and after transitions - for example, upon returning from another room a child might be encouraged to indicate what he/she had done with the other teacher or therapist.

Tickets to locations. Typically, nonhandicapped children have many more opportunities to choose activities and receive feedback about those choices than do physically handicapped learners. For example, children who can speak have opportunities for feedback as to whether they correctly label events and objects that nonspeakers rarely have. The use of "tickets" provides a way of allowing nonspeakers to designate choices and to receive feedback. In addition to providing a means of making choices, "tickets" are also useful teaching tools. Many times verbal information is given with a visual cue to reinforce it. For example, nonspeakers are often told when it is time for a new activity and are then asked to move to this activity in a new location. The use of tickets in this situation allows the teacher to provide a visual cue that helps children connect the picture, the spoken word and the activity each represents.

This procedure for using "tickets" typically moves through the following stages. First, the teacher will announce the new location and/or the activity and give the child the designated "ticket" or a symbol. After the child has the concept that this "ticket" signifies the coming activity, the teacher can then move to the next phase. Second, the teacher may give the verbal direction and present the child with two choices of "tickets". After the child can discriminate between these two choices, additional "tickets" may be added. Finally, with the verbal direction, the child should be able to choose the correct "ticket" for each program change.

SOFTWARE DEVELOPMENT

The development of three computer programs was undertaken during this project. The first program, "a switch program", is the product of a collaboration of this project with Mr. James Keefe, Dr. John Boyd and Dr. Patricia Hutinger. This program builds upon software developed previously (Rosenberg & Robinson, 1988). The software under development runs on the Apple II family of microcomputers. It allows learners to control environmental events with switch inputs to the computer. An important feature of this program is its ability to create complex events that go beyond simple cause and effect tasks. For example, turn taking activities have been created using this program. This task requires two learners to take turns pressing their switches in order to run a toy train between them.

The second program under development is a graphics package and authoring system for the Apple IIgs. Development of this software involves the

Figure 6. Communication intervention worksheet

Name: Lori Date:

Activity: Snack

Components of Activity: Requesting food items

Purposes of Activity for this Child: Communicate choices *

Barrier(s) Identified: Imparied oral-motor skills

Intervention Options	Relevant Child Characteristics	Priorities of Options
1. Increase specific skill. Specify potential instruction: Therapy to improve oral speech	Attempts to verbalize, but is not generally understood. Work on speech has slowly produced improvements.	Continue therapy. Improved speech is long term goal.
2. Compensatory skill. Specify potential compensation(s). Point to indicate choice	Language comprehension estimated at 2 year level. Hand skills adequate for pointing and signalling.	Institute immediately.
3. Environmental modification. Specify potential modification(s). Place food items in front of child to facilitate cirect selection	Reach and point permits direct selection.	Institute immediately.
4. Activity adaptation. Specify potential adaptation(s). Indicate selections using photographs of the available food items	Beginning to understand correspondence between objects and photographic representations.	Begins to assess and train correspondence between photo's and food items.

* For the purpose of this illustration only a communication goal is considered.

collaboration of Mr. William Winsor, Dr. Patricia Hutinger and Dr. Susan Hupp. The development of this software was prompted by the recognition that children who are cognitively under two years have difficulty recognizing the images presented to them on computer monitors. When completed this program will provide realistic graphic images that may be more readily understood by children. These images are used with an authoring system that makes use of a touch screen or switch and produces synthesized speech for young children whose ability to speak is substantially impaired by their motor disorders. The authoring system and graphic images can also be used to create a variety of instructional activities. Tasks involving the matching and discrimination of shapes and colors have been constructed using this software. For example, learners might be asked to identify the image that is different from the others on the screen. A correct response could be set to produce a new screen and speech output praising the learner. An incorrect response might produce corrective feedback in the form of synthetic speech and the erasure of the incorrect item. At this point, the development of these two programs is not yet complete. Software development will be completed during 1990, after which publishers will be sought.

Lastly, the development of a microcomputer based expert system was undertaken in collaboration with Dr. Richard Short of Eastern Kentucky University. This system is based on Project Participate's decision process. When completed, this expert system will specify questions which need to be addressed when assessing participation deficits and planning interventions as well as identifying potential intervention strategies and procedures.

STAFF TRAINING

Implementation of Project Participate by educational personnel requires a knowledge of and commitment to the achievment of compatibility between the characteristics of the preschoolers served, staff members' teaching styles, and the activities provided those young learners so that pupil participation can be maximized. Staff must understand the effect of their own behavior on learners and of the ways in which the characteristics of the learning environment and the program's activities interact with children's abilities and limitations. Staff need to be able to identify both participation deficits and barriers to participation as well as being able to devise strategies for increasing the fit between program and child. In addition, a working knowledge of devices commonly used to adapt activities is needed if staff are to be able to quickly and successfully address learner participation problems. The competencies needed by teachers in order to implement Project Participate, along with the competencies that a program coordinator should display, have been listed in Appendix B. A syllabus for training staff in Project Participate's approach to assessment and intervention is under development and will be completed shortly. Recommendations for written and videotaped materials will be included with the syllabus. Finally, a videotape is being developed for use with the syllabus.

Preparation of LPS staff to utilize procedures and materials supplied by Project Participate occurred through inservices, through consulation provided by project staff and through interaction during staffings. In addition, during Years 1 and 2, project staff modeled procedures and the use of materials by intervening directly with target children. During Year 3, pro- ect staff spent considerably less time working directly with the children in order to expand opportunities for LPS staff to implement project related activities independently.

EVALUATION

Target Population

Criteria for inclusion in Project Participate are described in this report as are age and disability characteristics (See Pupil Population and Table 1). Target children were enrolled in either a home-based, a part-time transitional classroom or a full-time center-based classroom program depending upon age and medical status. There was a total of 24 handicapped preschool children served by Project Participate during its three year tenure in the Lincoln Public Schools. Table 5 describes the numbers, placements, and carry-over of pupil participants during this period. There was a total of 10 pupils served in Year 1 of the project, 12 in Year 2, and 18 in Year 3, with carry-over from year to year for all but one of the pupils in Years 1 to 2 for whom it was possible. That pupil was dropped after a photo release could not be obtained.

Table 5

LPS Pupil Participation, Placements, and Carry-over

Year 1 1985-86	Year 2 1987-87	Year 3 1987-88
Total = 10	Total = 12	Total = 18
N = 3 Center ------------------	Graduated*	
N = 1 Center ------------------	------------------------------	
N = 1 Homebased ---------------	Died*	
N = 3 Homebased ---------------	Transition -----------------------	Center
N = 1 Homebased ---------------	------------------------------	
N = 1 Transition --------------	Center -------------------------	
Entering = 10		
	N = 1 Homebased ------------------	Dropped*
	N = 1 Homebased ------------------	Died*
	N = 1 Homebased ------------------	Transition
	N = 1 Center --------------------	Moved
	N = 2 Center ------------------------	
	Entering = 6	
		N = 1 Homebased
		N = 4 Transition
		N = 3 Center
		Entering = 8

* Not included in total for year.

In addition, two children were provided use of an electric wheelchair through MCRI. However, no formal evaluation of that work has been conducted. This evaluation addresses only those activities implemented within the Lincoln Public Schools.

Decision Process Model

The task of the intervention teams was to design and implement procedures and/or materials which would facilitate a target child's participation in the curriculum. Recall that children are nominated for Project Participate by their teachers who describe the child's participation deficits in terms of the major areas of the curriculum (See Appendix A for Form A). Each child's particular pattern of participation deficits and abilities is unique.

Thus, the design of useful interventions is a clinical process based on the observations and expertise of a variety of practitioners in diverse fields - education, psychology, speech pathology, occupational and physical therapy. The process of assessment and design of intervention can become unwieldy, given the great heterogeneity of this target population and the large range of curricular content and materials available. Accordingly, the professional staff spent about one and a half years codifying the team clinical process used in order both to clarify the nature of their task as well as to facilitate their own work and the training of others. The result of that codification is called the Participation Decision Model and is described earlier in this report. It is a major accomplishment to be able to describe both the steps necessary in assessment and planning of interventions which increase child participation, and the major categories of interventions which have been successful with this population, particularly as there will be increased national concern focused on this age group as P.L. 99-457 is implemented in the next several years.

The evaluation of the Decision Process Model must begin by asking if the pupil outcomes based on its use are fruitful. Do pupils demonstrate increased participation in the curriculum as a consequence of interventions based on the model? If the answer is yes, then future studies may look at the transferability of the Decision Model to other sites. If the answer is no, such efforts to generalize the model would not be warranted. The next section describes the evaluation of pupil intervention outcomes based on staff use of the Decision Model.

Pupil Intervention Outcomes

Pupil intervention outcomes were evaluated based on two different data sources, pupil files and ratings of video tapes of pupil performance in an adapted and in an unadapted situation. All assessments and ratings were completed by project personnel and constitute internal evaluations. In each case, however, more than one staff member did the assessment, and consensus was developed among raters without difficulty. The variety of data, while possibly subject to internal project bias, yields consistent results and the video tapes are available for review at the Human Development Center, Winthrop College, Rock Hill, South Carolina.

<u>Documentation in student files.</u> Pupil files containing staffing, coordinator and teacher notes and observations were reviewed by the project coordinator, a teacher consultant employed by the Lincoln Public Schools, and by the project director. If documentation of an effective intervention of any of the types described by the Decision Model could be found in the pupil file for a given academic year, the file was coded "+". If none could be found, the file was coded "-". In cases of ambiguity or dispute, the file was coded "?". Thus, there are 40 possible data points, one for each academic year in which each of the 24 pupils were enrolled in the project (i.e., Year 1, N = 10, plus Year 2, N = 12, plus Year 3, N = 18, total = 40). Table 6 presents the results of these assessments of the pupil files. Thirty of 40 possible assessments were positive, six were negative, and seven were ambiguous. Thus, 70% of all possible annual instances of file documentation indicated that successful interventions were achieved. Furthermore, 20 of 24 students or 80% of pupils had at least one year of successful interventions documented.

Table 6

<u>Adequacy of Documentation in Student Files of Effective Interventions, Frequencies</u>

	Intervention Found +	Intervention Not Found -	Intervention Ambiguous ?	Number of Pupils Having +'s
Year 1	18	2	5	9 of 10
Year 2	5	4	2	4 of 6
Year 3	7	0	0	7 of 8
Σ	30	6	7	20 of 24

<u>Videotapes of adapted and unadapted situations</u>. Videotapes of pupils were recorded by a graduate assistant for the purpose of documenting project activities. Most tapes were obtained during the second and third years of the project. There were significant discontinuities in filming because of changes in personnel which required new personnel to learn how to videotape. As a consequence, videotapes were made by three different graduate assistants and the coordinator at various times during the last two years. Tapes were available for 18 of the 24 children in the project. Tapes for fifteen pupils included the segments requested by the evaluator, that is, segments observing one child under both adapted and unadapted circumstances which illustrate focal interventions. Some of the tapes contain observations of more than one intervention per child. Tapes on three children involving communication intervention were eliminated from this evaluation study because the raters felt that they had to make subjective inferences regarding communication intent and could not time the duration of the behavior appropriately as required. Accordingly, tapes on 12 children demonstrating 19 interventions form the basis of the assessment which follows.

The 19 videotaped paired instances of adapted and unadapted behaviors were assessed by the project coordinator and the research assistant. They were asked to code each segment of tape in two ways, first, for the amount of time the pupil spent interacting or participating with the curricular task/materials presented and, second, for the amount of time on task using the materials functionally, or as intended. Thus, each tape segment was coded for time on task using a loose definition in which any materials contact was accepted and a functional definition in which only appropriate behavior was coded. To illustrate, consider block play in which tower building or another arrangement of blocks would be a functional interaction but sliding blocks off a table inappropriate or not functional. Two tape segments included replications of the adapted play situation so that there are 21 adapted and 19 unadapted tape segments. Most tape segments were about two minutes long. They varied from 47 seconds to four minutes ten seconds, but most paired segments were of similar length.

Table 7 presents the mean percentages of time on task for adapted and unadapted intervention conditions under both timing definitions. It is clear that functional time on task more than doubles (246%) under adapted intervention conditions and that even time on task using the loosest of definitions shows that adapted conditions permit greater task/materials interaction as well, an increase of about 28%. Both differences are statistically significant. Furthermore, 17 of the 19 pairs of tapes show functional time on task greater in adapted than unadapted conditions. One pair of tapes has the same times and only one pair shows a reversal from what would be expected with a successful intervention.

Table 7

Mean Percentage of Time (in seconds) on Task

Intervention Condition	Types of Interaction	
	Functional	Any Interaction
Unadapted (N = 19)	24.38	63.00
Adapted (N = 21)	60.02	80.60
Improvement with Adapted Condition	+35.64	+17.60
T test	2.68 $p < .015$	5.91 $p < .000$

Although the planning of interventions to increase curricular participation of these severely handicapped young pupils is a clinical process, not readily subject to observation in any standardized way, both written and videotaped case records document the effectiveness of the great preponderance of interventions. This is direct evidence of the effectiveness of the interventions and indirect evidence of the utility of the Participate Decision Model.

The complete set of videotapes illustrate adapted materials and equipment as well as their use by 18 of the 24 pupils enrolled in Project Participate. These tapes are a rich corpus of qualitative descriptive materials which enhance our understanding of the adaptive possibilities for the severely handicapped preschool children in this project and for others similarly handicapped students. The tapes, even where comparable adapted and unadapted segments are not available, illustrate the possibilities open to children if careful positioning and appropriate technology are used. The range of applications of technology go from simple leaf switches to complex, interactive, computer-based communication devices. Videotapes illustrating these interventions are available for review at Winthrop College, Human Development Center, Rock Hill, SC. They have provided the basis for several professional presentations illustrated with slide "out-takes", and have been abstracted for use in the training course described in the later section on Dissemination.

Training and Transfer

In-service and parent-training programs were conducted by project staff, in addition to training school staff in the use of the Decision Model and equipment via staffings, intervention meetings, and classroom consultations. Table 8 presents the topics and numbers of participants for these programs during 1987-88.

Table 8

In-Service Training Programs in 1987-88

Topic	Target Participants	N
Decision Model	OTs and PTs	9
Decision Model	Preschool Teachers	12
Unicorn and Power Pad	School Staff	4
Power Pad	School Staff	5
Power Pad	School Staff	7
Toy Adaptation Workshop	Parents	8
		Σ 42

If project staff interaction with school staff - teachers, speech pathologists, occupational and physical therapists - promoted their involvement in using and/or designing adaptations to increase curricular participation of all handicapped preschool children, then one would expect to see equipment requests and other evidence of transfer of adaptation skills. Some such evidence is available. Equipment requests during 1987-88 were logged by the project coordinator. During the six month period from 11-17-87 through 5-17-88, there were 55 such requests, 15 involving repairs to existing adaptive equipment currently in use, and 40 for new materials. During the same period the coordinator kept notes on instances of teacher transfer, that is, using a staff diagnosed adaptation for a child other than the original target child or designing new adaptations for any child. There were 13 instances of such transfer noted by the coordinator. Examples include simply moving switchbased toys to other children, to designing choice boxes for classroom use, and developing simple materials such as audio tapes of mother's voice to use as reinforcing events, to ordering new computer software.

A brief survey of the nine classroom teachers who worked with project staff during the 1987-1988 school year was used to identify factors which facilitated or limited the teacher's ability to work on interventions to increase pupil participation. Five teachers responded. In rank order from most to least facilitating, the factors were (rank 1) availability of Project Participate staff to assist you, (tied for rank 3) teacher's knowledge of interventions, availability of consultation, and availability of therapy staff to assist, (rank 5) availability of workable strategies to increase participation, (tied for rank 6.5) teacher's knowledge of equipment, availability of equipment and/or materials, and (rank 8 facilitating and limiting equally) availability of time to prepare. In sum, teacher's currently find availability of consultants most important to their ability to work on interventions and time to do so the most restrictive factor.

Thus, while we have some evidence of staff skill in developing interventions by their equipment requests and observations of instances of transfer, teacher development of interventions remains dependent upon consultation and will probably continue in the future only to the extent that therapy staff and equipment support are available to help with these interventions.

In addition, LPS teachers and therapists who had worked with Project Participate were asked to evaluate the project. This was done at the end of each school year using the same questionnaire all three years. The purpose of the questionnaire was to monitor staff perceptions of Project Participate. The average response rate over the three years was 80%. The survey concerned itself with the issues of the value of consulation and support provided to LPS staff, the usefulness of staffings, reliability of the equipment, comfort of staff members in using the equipment and their general assessment of the Project (see Appendix D for a complete copy of the questionnaire and tabulated responses). The questionnaire consisted of 19 Likert type items. Satisfaction with the project was generally high. Table 9 provides responses to two items that summarized satisfaction.

Staff ratings of overall success of project activities with children (item 14) were highest at the end of this project. Staff ratings of success implementing objectives identified in staffings (item 7) reflected fewer "very successfuls" and more "moderately successfuls" in Year 3 than in previous years. This shift may reflect the fact that the amount of direct child treatment provided by project staff was substantially reduced at the beginning of Year 3 as part of efforts to prepare LPS personnel for the termination of Project Participate.

Working relationships among project and LPS staff appeared satisfactory throughout Years 1, 2 and 3; ratings of several aspects of collaboration

Table 9

Teacher Responses to Selected Satisfaction Questionnaire Items

Item 14: Overall, do you view project activities for the (target) children as successful?

	No Response	Very	Moderately	Slightly	None	N/A
Year 1	15%	47%	40%	13%	0%	0%
Year 2	15%	33%	47%	20%	0%	0%
Year 3	18%	50%	39%	11%	0%	0%

Item 7: Have the activities and procedures that were selected during staffings bee implemented successfully?

	No Response	Very	Moderately	Slightly	None	N/A
Year 1	15%	40%	40%	7%	0%	13%
Year 2	15%	27%	60%	13%	0%	0%
Year 3	18%	17%	72%	11%	0%	0%

(items 2,3,5,6,12) were highest at the end of Year 3. Particularly important is the finding that 56% of the respondents found project staff's suggestions for working with the children (item 2) to be "very" helpful.

An important service Project Participate offered was the provision of equipment to LPS staff. Respondents (83%) in Year 3 regarded Project Participate as "very" helpful in providing equipment and supplies (item 8). By Year 3, 94% of the teachers and therapists were "very" or "moderately" comfortable using the equipment provided by the project (item 11). Also highest in Year 3 was satisfaction with the help LPS staff received in learning to use the equipment (item 10) - with 89% of the respondents indicating receiving "very" or "moderate" help from Project Participate.

Items reflecting support to LPS staff (1,2,3,14) through consultation and working directly with children indicate that the project was seen as most helpful when consulting on interventions and working directly with children. The project was seen as less helpful in providing assessment information. During each year respondents consistently indicated that individual discussions were more helpful than staffings. The perception that staffings were "less helpful" than direct discussions probably stems from the fact that discussions regarding children usually occurred after staffings where specific objectives had been identified. Staffings were less focused than consultations about children because the staffings had to address a broader range of questions and had the task of narrowing the team's focus to one or two significant participation problems.

Interventions focused on communication (item 15) and motivation (item 19) were highly rated during all three years, whereas social interaction and mobility were somewhat less highly rated. Respondents perceived project participate as least helpful with academic activities.

DISSEMINATION

During its three year span, Project Participate staff provided training to professionals within the Lincoln Public Schools and through presentations at state and national meetings. In addition, Project Participate's decision model has been presented to ACTT staff at Western Illinois University.

Inservice training has addressed the use of Participate's Decision Process to develop interventions that enable pupils who have cerebral palsy to be active learners. At these inservices, the rationale for using the Decision Process to guide team problems solving was explained. Slides and videotapes were used to illustrate concepts and interventions used with the children served by Project Participate.

In addition, educational and therapy personnel from Fremont and Holdredge, schools in Nebraska, and from Winthrop College in Rock Hill, South Carolina visited Lincoln to observe Project Participate's operation. At this point, dissemination continues through distribution of project reports. Several papers are currently being prepared for publication. Targeted audiences for this work include school administrators, special education directors, early childhood project directors, state departments of special education, teachers, developmental therapists, and lead agencies in the implementation of P.L. 99-457. A listing of presentations is included in Appendix C.

A syllabus, described under STAFF TRAINING, is under development. Recommended written and videotaped materials will be included with the syllabus. The syllabus and a videotape, developed for use with the syllabus, will be available through the Human Development Center (HDC), Winthrop College, Rock Hill, South Carolina 29733.

A workshop for parents of children served in LPS classrooms by Project Participate was held during Year 3 on an evening in December, 1987. This workshop was attended by six parents and three professionals. The purpose of this session was to familiarize parents with the kinds of adapted toys that are available for youngsters who have severe motor disorders and to assist parents in identifying suitable toys for their children.

During Year 3, Project Participate responded to 17 requests for information. Future requests will be handled by the HDC at Winthrop College, Rock Hill, S.C. 29733.

CONCLUSIONS

Access to learning activities cannot be taken for granted when pupils have motor disorders. These children are frequently unable to be active participants in their educational programs. The effects of their motor disorders upon their ability to gain access to activities and materials, must be moderated in order to increase their participation. Successfully enhancing child participation is a difficult task that can be accomplished only through meticulous attention to optimizing child-program compatability, in conjunction with careful planning and implementation of interventions by team members.

Throughout its existence Project Participate has focused on the goals of developing strategies that enable children to participate actively in their school programs and helping educators deal with the complex problems that impede child participation. The first goal has been accomplished by providing an approach to increasing participation and documenting its effectivenss. This report has provided descriptions indicating that compensatory strategies can be tailored to the needs and characteristics of preschoolers who have severe motor disorders. Moreover, numerous compensatory strategies used by Project Participate have significantly increased interaction with learning materials by those children.

Second, a decision process was developed to illustrate Project Participate's approach to eliminating participation deficits. The Participate Decision Process can be used to guide assessment and planning. Additional training materials were developed to assist teachers' efforts to learn to use the approach utilized by Project Participate. These materials included intervention planning forms and intervention guidelines that were developed to help professionals learn to use Project Participate's approach to eliminating participation deficits.

An indication of Project Particpate's success is the high degree of teacher and therapist satisfaction with the project. In addition, this study has produced evidence that teachers are able to utilize the procedures and technology used by Project Participate to enhance participation by their pupils. Teachers report that the ability to implement participation strategies depends on several factors including the availability of consultation, materials, equipment and time needed to permit the implementation of the activities. Teachers found direct consultation the most useful means of providing information about the facilitation of child participation. They indicated that time constraints were the greatest impediments to preparing and implementing interventions.

Project Participate offers both a viable means by which young learners who have motor disorders can attain greater access to their educational environment and materials that have been used to guide professionals' efforts to allieviate child participation problems. It is our belief that educational personnel who have adequate time to work on participation problems and have access to consulation from other team members can use these materials to successfully increase the active involvment of these children in their educational programs.

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APPENDIX A

Intervention Planning Forms

FORM A: ASSESSMENT OF LEVEL OF PARTICIPATION

TARGET STUDENT NAME: ______________________________
DATE: ______________________

For the following areas please indicate this child's typical level of independent participation in comparison to his classmates. For each area first indicate this overall level of independent participation next to the major heading. Where you rate children much less independent than their peers, please also rate typical participation levels for the specific activities.

If other activities that occur regularly in your classroom are not listed below, please list these on the extra lines provided in each category.

PRESCHOOL ACTIVITIES	LEVEL OF PARTICIATION				
	EQUAL INDEP	LESS INDEP	MUCH LESS INDEP	NOT AT ALL INDEP	NOT OCCU
ENTRY					
MOVEMENT INTO CLASSROOM					
GREETING STAFF					
GREETING PUPILS					
SELF-HELP					
DRESSING-UNDRESSING					
MOVEMENT ABOUT ROOM					
TOILETING					
EATING					
REQUESTING ASSISTANCE					
EATING					
SET UP/CLEAN UP					
SERVING					
INITIATING INTERACTIONS					
RESPONDING TO INTERACTIONS					
REQUESTING FOOD					
EATING FOOD					
THANKING					

PRESCHOOL ACTIVITIES	EQUAL INDEP	LESS INDEP	MUCH LESS INDEP	NOT AT ALL INDEP	NOT OCCR
CIRCLE TIME					
SHARING PERSONAL INFORMATION					
REQUESTING INFORMATION					
STORY TELLING					
CHOOSING CENTER ACTIVITIES					
SINGING					
FINGER PLAYS					
COUNTING					
VIEWING GRAPHIC INFORMATION					
SHOW AND TELL					
JOB CHART					
CALENDAR					
CLASSROOM MAINTENANCE					
CENTER ACTIVITIES					
ART					
PLAY TABLE					
PLAY HOUSE					
VEHICLES					
COOKING					
QUIET AREA					
BLOCK AREA					
PHYSICAL EDUCATION					
ACTIVITY					
MUSIC					
ACTIVITY					
RESESS					
CHOOSING ACTIVITY					
ACTIVITY					
ACTIVITY					
ACTIVITY					
ACTIVITY					

FORM B: ABILITIES AFFECTING PARTICIATION

TARGET STUDENT NAME:____
DATE:____
CLASSROOM:____
OBSERVER:____

STAFF: Students are unable to participate independently for many different reasons. In order to intervene effectively, it is necessary to identify the barriers to participation. Activity participation rated by the teacher in which the child functioned as "much less", "not at all" or "does not occur" are marked with an *. Please mark an (X) under those ability areas in which child skill deficits interfere with this child's classroom participation. If you have other areas of concern, please indicate these and (X) skill area.

PRESCHOOL ACTIVITIES	ABILITIES AFFECTING PARTICIPATION					
	AREA CONCERN	MOTOR	COMM	COG	SENS PERC	SOCL PERS
ENTRY						
MOVEMENT INTO CLASSROOM						
GREETING STAFF						
GREETING PUPILS						
SELF-HELP						
DRESSING-UNDRESSING						
MOVEMENT ABOUT ROOM						
TOILETING						
EATING						
REQUESTING ASSISTANCE						
EATING						
SET UP/CLEAN UP						
SERVING						
INITIATING INTERACTIONS						
RESPONDING TO INTERACTIONS						
REQUESTING FOOD						
EATING FOOD						
THANKING						

PRESCHOOL ACTIVITIES	ABILITIES AFFECTING PARTICIPATION					
	AREA CONCERN	MOTOR	COMM	COG	SENS PERC	SOCL PERS
CIRCLE TIME						
SHARING PERSONAL INFORMATION						
REQUESTING INFORMATION						
STORY TELLING						
CHOOSING CENTER ACTIVITIES						
SINGING						
FINGER PLAYS						
COUNTING						
VIEWING GRAPHIC INFORMATION						
SHOW AND TELL						
JOB CHART						
CALENDAR						
CLASSROOM MAINTENANCE						
CENTER ACTIVITIES						
ART						
PLAY TABLE						
PLAY HOUSE						
VEHICLES						
COOKING						
QUIET AREA						
BLOCK AREA						
PHYSICAL EDUCATION						
ACTIVITY						
MUSIC						
ACTIVITY						
RESESS						
CHOOSING ACTIVITY						
ACTIVITY						
ACTIVITY						
ACTIVITY						
ACTIVITY						

Appendix B

Planning Guidelines

Staffing Process

1. Identify participation deficits in one or more activities.

2. Contact parents and therapy staff as needed to form assessment and intervention planning team.

3. Identify learner's current level of abilities.

4. Identify barriers to active participation in each activity in which involvement is restricted.

5. Hold staffing to pool assessment information and to develop interventions designed to eliminate the effects of barriers to active participation in each of the targeted activities.

6. Implement interventions that have been assigned highest priorities by team members.

7. Monitor child participation on targeted activities.

8. Evaluate effect of intervention. If intervention is successful, continue. If not return to step 4.

Facilitating Motor Access

1. Identify participation objective during staffing.

2. Assess pupil's repertoire of motor skills in different positions and with different configurations of equipment.

3. Identify motor patterns that may permit pupil to engage in participation objective.

4. Evaluate child's performance in participation objective using Form A. If motor performance continues to be problematic go to 5.

5. Identify strategies to facilitate use of targeted motor skills:
   a. Position materials to provide child optimal motor access (see Facilitating Access to Materials).

   b. Stabilize materials (see Facilitating Access to Materials).

   c. Position child so that use of targeted motor skill is optimal for the activity (see Facilitating Motor Skills).

   d. Stabilize child - head, trunk, arms and hands (see Facilitating Motor Skills).

6. Intervene to facilitate use of targeted motor skills for participation objective.

7. Determine if configuration of child and equipment has successfully enhanced learner's motor skills. Photograph when a satisfactory implementation is obtained.

8. Intervene to eliminate other barriers to active participation as needed.

Facilitate Access by Enhancing Child Motor Skills

Objective: Facilitate the performance of motor skills required for participation in targeted activity.

1. Identify potential motor behaviors with which child could engage in targeted activity.

    a. Evaluate the activity to determine the motor operations (e.g., sending, retrieving) the activity requires.
    b. Identify current motor skill with which the child could engage in the activity.

2. Position child to permit optimal access to activity.

    a. Select positioning arrangements that facilitate:

        i. Stability of pupil's head, trunk, and hands.
        ii. Muscle tone that permits optimal range of movement.
        iii. Strength with which the child is able to exercise those movements.
        iv. Child endurance with the activity.

    b. Evaluate child's performance of each potential motor behavior that might be used to engage in activity in several positioning arrangements.

    c. For positioning in sitting address:
        i. Hips - Hips securely placed in center of chair. Weight distributed evenly across seat. Slight upward flexion of hips.
        ii. Feet - Feet flat or bent upward slightly and placed securely on floor or footrest.
        iii. Trunk - Trunk upright and stable.
        iv. Shoulders - Shoulders relaxed, neither arched forward nor back.
        v. Arms - Arm forward slightly, downward and toward midline.
        vi. Head - Head upright and stable. Neck relaxed.

    d. Select position that permits optimal child performance of the task.

Facilitating Access to Materials

Objective: Maximizing child access at current motor skill levels by placement and stabilization of materials.

1. Adjust the height of educational materials.
   In most instances hand use is facilitated when materials are not elevated above the height of the pupil's sternum.

   Assess by observation of pupil's ability to interact with objects provided at different heights.

2. Place materials where child access is optimal.
   Access is facilitated by placing objects on an arc of movement that the pupil can reliably produce.

   Assess: a) Observe and note the arcs that pupil's movements reliably describe and then b) determine the most accessible locations by setting up a grid on the work surface and rating accuracy of child's movements at different points on the grid.

3. Select orientations of materials that facilitate access.
   Place objects on different vertical planes to allow optimal child access.

   Facilitate the child's ability to coordinate eye and hand while the material/object is placed at different orientations.

   Assess by observing and rating child access to object at these angles (eg. 0° (flat), 45°, 90°).

4. Stabilize objects.

   Objects should be stable to prevent them from falling or moving so that access is not reduced as a result of interacting with the materials.

   Determine the need for stabilization of the materials through observation. Select a procedure for increasing the stability of the materials by a) increasing friction between object and work surface (eg. Dysam) b)magnetizing the materials c)mechanical restraints (eg. clamping object to table, toy frame) d) restrict movement of object (eg. confine movement of materials within a limited space by placing a ridge around it).

5. Facilitate access by modifying the materials.

   Assess the need for modification of the materials through observation of the pupil's ability to interact with the stable and properly positioned object.

Select a modification after evaluating the utility of several potential approaches to adapting the materials: a) alternative controls (eg. switch adaptation), b) modification to increase ease of manipulation including changes in shape and/or size of the object (eg., preschool crayons) or by adding a handle to the object.

Selection of a Switch

1. Identify motor movements for potential use in operating a switch. These movements should be reliably performed and should not cause excessive fatigue.

2. Identify potential locations for switch placement. Placement should give the pupil maximum control possible.

3. Identify potential switches to be used:
   a. The switch should accommodate previously identified motor movements and locations.
   b. The switch should be sensitive enough to be activated by the pupil.
   c. The switch should be durable enough to withstand use by the learner.
   d. The target area (area for activation) of the switch must be large enough to permit reliable operation by the pupil.
   e. The switch should provide the student with appropriate sensory feedback.
   f. The delay between switch activation and object activation should be extremely short under most circumstances.

4. Select the most efficient configuration of a switch, its placement, mode of operation, and pupil's position. This configuration should not interfere with other activities the pupils regularly engages in.

5. Switch mounting is determined by the overall configuration that is selected.

   a. Switch mounting should be easy to set-up and take down.
   b. The learner should not be exposed to potentially harmful aspects of the switch such as sharp edges and shock hazard.
   c. Mounting arrangement for the switch should not interfere with other activities when the switch is not in use.

6. Implement configuration.

7. Monitor child use.

8. Revise as needed.

Identification of Switch Problems

I. If a switch operated toy or device <u>cannot</u> be turned on using the switch check the following:

1. Verify that the switch does not turn the toy on and off.

   a. Make certain the on-off switch on the toy in the "on" position.

   b. Tighten connections. Check to see that the plug fits all the way into the jack.

2. Determine if the toy or device operates when the switch and adaptor are removed.

   a. If it <u>does not</u> operate, there is a problem in the toy.

   (Check to see if fresh batteries will allow it to operate.)

   b. If it <u>does</u> operate the problem may be in the switch adaptor or the switch. Evaluate the switch as suggested in item 3.

3. Test the switch by operating another toy or device such as a tape recorder. If the switch can turn this other device the problem is most likely in the adaptor.

4. If the switch adaptor appears at fault, replace it with another adaptor and try to operate the toy using the switch. If the toy can then be operated the adaptor should be closely examined for defects.

   a. Are all connections soldered well? Are wires broken?

II. If a switch operated toy or device <u>runs continuously</u> using the switch check items 1, 2, 3 and the following:

a. Do bare wires, particularly in the adaptor, touch each other or metal parts of the toy that they should not contact? If so cover these with tape.

b. Check to see if the terminals of the jack have been bent so they are touching each other or another wire.

Social Interaction Process

I. Assess participation needs.
   a. Activity inventory. Compile a list of pupil's major activities.
   b. Identify areas used for each activity in the classroom.
   c. Identify materials frequently most used while engaged in that activity.

II. Assess level of student participation.
   a. For activities under study, observe child on 2-3 occasions and rate level of participation.
   b. Compile results of observations. Identify activities in which child's participation is low.

III. Identify ability barriers to participation.
   a. Determine from observations which ability deficits impede child participation.
   b. Consider each ability and identify specific deficits in underlying subskills.

IV. Assess intervention options.
   a. Identify social interaction target goals for child.
   b. Identify child skills to be enhanced.

V.
   1. Modify physical environment to permit increased social interaction.
      a. Eliminate barriers to visual contact.
      b. Provide objects that encourage social interaction.
      c. Identify available motor behaviors that can be used to engage object manipulation.
      d. Position to facilitate if adaptations of toys are needed.
      e. Determine if adaptations of toys are needed.
         1) Adapt toys as needed.
         2) Select instructional procedures to be used to teach use of adapted toys.
         3) Provide physical assistance as needed.

   2. Modify social environment.
      a. Identify peer behaviors for direct intervention.
      b. Reinforce peers for initiations of interactions with target children.
      c. Reinforce peers for responding to intitiations by target children.

   3. Identify social interaction goals for target children.
      a. Identify social interaction goals for target children.
      b. Reinforce spontaneous occurrences of desired behaviors.
      c. Verbally prompt desired behaviors if these do not occur.
      d. Provide physical prompts as needed.

Communication System Design

1. Determine whether communication deficits are a barrier to child participation.

2. Determine which approaches to communication are to be used.
   A. Teaching of vocal communication
   B. Alternative communicative behaviors
   C. Support of communication by environmental modifications
   D. Augmentative communication system

3. Identify the characteristics of the communication system to be used.

   A. Alternative communicative behaviors
      1) Natural gestural system
      2) Sign language

   B. Environmental modification
      1) Natural objects to support verbal communication
      2) Use of pictures to support verbal communication

   C. Augmentative system
      1) Assess child's motoric skills to determine access method (direct selection, scanning)
      2) Determine vocabulary child will need
      3) Determine how vocabulary will be represented (e.g., pictures, line drawings, symbols). The following lists potentially appropriate levels of representation:
         a. the real objects that will be used in the activity.
         b. miniatures of the objects.
         c. photographs of the objects themselves.
         d. photographs of similar objects.
         e. line drawings of the object.
         f. a representational line drawing.
         g. a representation that is more abstract, such as a Bliss symbol.
         h. a printed word.

      4) Determine the type of output needed (voice, print, computer access, environmental control)

4. Design communication system based on child needs and characteristics identified in #3.

5. Train child in the use of the system.

6. Train caregivers in the use of the system.

7. Evaluate activity with current system to determine if further changes are needed.

Staffing Requirements

Project Coordinator Job Description

1. Assist teachers to begin selection process by providing forms and information on the completion of these forms.
2. Mail release forms to the parents or arrange for the teacher to have these completed.
3. Transfer information from the teacher's form to forms for the speech, OT, PT., and vision consultant. Mail these forms to participating staff members.
4. Arrange for a staffing meeting for the child.
5. Chair the staffing.
6. Write up the results of the staffing and mail this information to team members.
7. Arrange for materials that are requested to carry out the intervention.
8. Instruct the teachers in the use of materials provided.
9. Consult with the teacher in the integration of the materials into the classroom.
10. Consult with other team members on equipment use as requested.
11. Repair or arrange for repair of equipment.
12. Keep up to-date on new materials and techniques for interventions.
13. Provide inservice to LPS staff on materials and techniques.
14. Monitor interventions with children through teacher, OT and PT conferences.
15. Maintain children's files.
16. Monitor budget and order necessary equipment and supplies.
17. Gather Project data.
18. Provide dissemination of the project through presentation and written materials.

Project Coordinator Competencies

1. Able to work with a variety of disciplines.
2. Able to provide instruction to adults.
3. Able to demonstrate good organizational skill.
4. Able to coordinate a team.
5. Demonstrates good observational skills to assist in child assessments.
6. Demonstrates effective interactional skills with children.
7. Demonstrates skill in identifying configurations of child positioning and placement of materials that facilitate learner access.
8. Able to assist in the development of interventions to increase learner participation.
9. Able to assist in the implementation of interventions.
10. Has knowledge of a variety of different types of switches and is able to utilize then effectively.
11. Able to operate an Apple II microcomputer.
12. Able to program and use a Unicorn board.
13. Able to install and use peripheral devices for speech and alternate access.
14. Able to recommend software appropriate for use with preschoolers.
15. Able to program and use a Touch Talker.
16. Is aware of sources of equipment and materials frequently needed for increasing child participation.

17. Able to monitor budget and coordinate purchases.
18. Able to diagnose and make simple repairs.
19. Is aware of sources of technical assistance.
20. Maintains current knowledge of assistive technology.

Teacher Competencies for Implementing Project Participate Activities

Assumptions of Participation Model:

1. Able to discuss the importance of active participation
2. Discuss barriers to participation that affect program involvement by handicapped pupils.
3. Describe steps in problem solving to eliminate barriers to child participation.
4. Demonstrate competency in identifying participation targets for intervention.
5. Discuss the ways in which the adaptation of an activity can change the cognitive, motor, and/or sensory skills required to engage in it.
6. Discuss the use of the Participation Decision Model for intervention planning.

Technical Components:

1. Discuss the relationship of child's positioning to ability to access learning materials.
2. Discuss the importance of positioning a switch for giving child access to that switch.
3. Identify types of switches.
4. Describe means of activating these by movement of at least three different body parts (eg. hands, feet, head, and chin).
5. Discuss several strategies for mounting switches.
6. Explain the purpose and use of a battery adapter.
7. Identify toys suitable for adaptation.
8. Explain how to attach a switch to a battery powered toy using a battery adapter.
9. Explain how a 110-volt relay can be used to permit control of a toy or appliance by a switch.
10. Describe several potential problems that should be considered when a switch controlled and battery powered device does not operate.
11. Give examples of how computers can be used for communication, computer assisted instruction and group activity.
12. Describe the steps required to turn on and run a program on a microcomputer.
13. Explain how to connect a Power Pad to a microcomputer.
14. Describe several applications of the Firmware card.
15. Know where to obtain assistance with technical problems.

APPENDIX C

Dissemination Activities

Presentations:

Increasing participation of preschoolers who have motor disorders. National Conference on Children with Special Needs. Louisville, Kentucky. October 1986.

Decision processes for microcomputer use with handicapped preschoolers. Closing the Gap Annual Conference. Minneapolis, Minnesota. October 1986.

Microcomputer based play activities for preschoolers who have severe motor disorders. Closing the Gap Annual Conference. Minneapolis, Minnesota. October, 1986.

Increasing participation of orthopedically handicapped preschoolers. Eighth Annual RAP Conference on Early Childhood Special Education. Kearney, Nebraska. March 1987.

Increasing participation of preschoolers who have motor disorders. Annual Convention Council for Exceptional Children. Chicago, Illinois. April 1987.

Increasing participation of preschoolers: A decision processing model. Annual Conference American Education Association. Boston, Massachusetts, 1987.

Increasing participation of preschoolers who have motor disorders. Consortium for Special Education 1987 Convention. Lincoln, Nebraska. October 1987.

Increasing participation of preschoolers who have motor disorders. Integrating Technology into the Home, School and Work (TAM) Annual Conference. Baltimore, Maryland. January 1988.

Applicability of assistive technology during preschool. Technical briefing for state level policy makers. Nebraska State Department of Education. May 1988.

It's my turn! Using computer controlled toys to teach social behavior. Closing the Gap Annual Conference. Minneapolis, Minnesota. October 1988.

Publications:

Rosenberg, S. & Robinson, C. (1990). Assessment of the Infant with Multiple Handicaps. In E. Gibbs & D. Teti (Eds.) Interdisciplinary Assessment of Infants. Baltimore, Md. Paul H. Brookes Pub. Co.

APPENDIX D

Project Participate Questionnaire

PROJECT PARTICIPANT QUESTIONNAIRE

Regarding Project Participate children with whom you have been involved:

	Question	Yr.	Very	Moderate	Slight	None	NA
1.	To what extent would you say that Project Participate has been helpful in providing you with information regarding this child's needs and abilities?	1	33%	60%	7%	0%	0%
		2	27%	53%	20%	0%	0%
		3	39%	39%	22%	0%	0%
2.	To what extent has Project Participate been helpful in providing suggestions for useful ways of working with this child?	1	40%	60%	0%	0%	0%
		2	40%	47%	13%	0%	0%
		3	56%	33%	11%	0%	0%
3.	How helpful have individual discussions with Project Staff been?	1	60%	23%	13%	0%	0%
		2	53%	40%	7%	0%	0%
		3	61%	33%	6%	0%	0%
4.	How useful have the staffings of children been?	1	46%	33%	7%	0%	13%
		2	47%	40%	13%	0%	0%
		3	44%	44%	11%	0%	0%
5.	How much was your input considered in the selection of the child's project activities?	1	66%	20%	13%	0%	0%
		2	73%	13%	7%	7%	0%
6.	Have these discussions made you more aware of the relationship of your work with this child to the activities of the other professionals?	1	33%	26%	33%	0%	7%
		2	40%	33%	13%	7%	0%
		3	44%	44%	6%	0%	0%
7.	Have the activities and procedures that were selected during the staffings been implemented successfully?	1	40%	40%	7%	0%	13%
		2	27%	60%	13%	0%	0%
		3	17%	72%	11%	0%	0%
8.	To what extent has Project Participate been helpful providing you with equipment and supplies for use with this child?	1	66%	26%	0%	0%	7%
		2	40%	40%	7%	0%	13%
		3	83%	17%	0%	0%	0%

		Yr.	Very	Moderate	Slight	None	NA
9.	How reliable is this equipment?	1	33%	53%	7%	0%	7%
		2	40%	33%	13%	0%	13%
		3	58%	44%	6%	0%	0%
10.	Did Project Participate help you learn how to use equipment that was provided?	1	33%	20%	26%	7%	13%
		2	53%	13%	13%	0%	20%
		3	72%	17%	0%	0%	11%
11.	How comfortable are you in using the equipment that was given to you?	1	80%	7%	7%	0%	7%
		2	57%	21%	0%	0%	21%
		3	61%	33%	6%	0%	0%
12.	Overall was information about the purpose of the project activities for the child(ren) adequate?	1	53%	20%	20%	7%	0%
		2	53%	40%	7%	0%	0%
		3	67%	33%	0%	0%	0%
13.	Overall do you view the Project Participate activities with the child(ren) successful?	1	47%	40%	13%	0%	0%
		2	33%	47%	20%	0%	0%
		3	50%	39%	11%	0%	0%
14.	Has Project Participate been helpful in providing staff who were able to help implement program activities in your classroom?	1	47%	33%	0%	0%	20%
		2	40%	27%	7%	0%	27%
		3	56%	22%	0%	11%	11%

With regard to the following curriculum areas:

	Yr.	Very	Moderate	Slight	None	NA
15. How helpful has project Participate been in the area of communication?	1	53%	20%	20%	0%	7%
	2	27%	27%	20%	13%	13%
	3	50%	22%	17%	0%	11%
16. How helpful has Project Participate been in the area of social interaction?	1	47%	26%	20%	7%	0%
	2	20%	47%	20%	7%	7%
	3	33%	33%	17%	6%	11%
17. How helpful has Project Participate been in the area of mobility and positioning?	1	26%	40%	13%	7%	13%
	2	27%	13%	27%	27%	7%
	3	11%	39%	28%	6%	17%
18. How helpful has Project Participate been in the area of academic activities?	1	21%	21%	21%	0%	38%
	2	13%	27%	13%	13%	33%
	3	17%	28%	6%	0%	50%
19. How helpful has Project Participate been in the area of pupil motivation?	1	40%	33%	20%	0%	7%
	2	40%	27%	27%	7%	0%
	3	44%	28%	17%	6%	6%

APPENDIX E

Materials Used by Project Participate

Appendix E contains a resource list of equipment and materials that were used to assist children who have severe motor disorders to more fully participate in their environment. It is not an endorsement by Project Participate or the Lincoln Public Schools of a particular company or product nor does it mention all products commercially available or their vendors.

TABLE OF CONTENTS

INTRODUCTORY MATERIALS

PHILOSOPHY

Children learn by acting and learning to control their environment. Numerous studies support the importance of active learning for the growth and development of young children.

Some children are at higher risk than others for participation related problems. Children with physical or sensory handicaps are at a great disadvantage in learning because they have fewer opportunities to control events (either physical or social) in their environment than do nonhandicapped children. For the physically impaired child, this lack of interaction with responsive toys and the lack of control over events in their lives can have several undesirable effects (Robinson, 1976; Robinson & Robinson, 1978; Robinson & Fieber, 1988). First, it seems likely that the inability to gain access to manipulable and responsive playthings can produce developmental delays in cognitive, communication, social and self-help skills. Second, the motivation of such children to seek interesting activities may diminish. For example, clinicians who work with physically disabled children report attitudes of passivity on the part of some children; we are arguing that this passivity is, in part, the result of their inability to control significant events in their lives (Seligman, 1975). The importance of learning to interact with and to exercise control over events is not limited to physical objects; children also learn through interaction with their parents and peers. However, children who have significant physical, sensory, and cognitive handicaps are less effective in acting on their social environment and are less able to engage in mutually satisfying interactions with their peers, parents and teachers than are non-handicapped peers (Beckman-Bell, 1981; Jones, 1977; Kohl & Beckman, 1984; Rosenberg & Robinson, 1988).

Following from the observations above, we feel it is important to systematically provide home and classroom situations that provide children who have handicaps, with opportunities to learn to control events and actively participate in their school activities in order to promote motivation and development of cognitive, communication and social skills (Tawney, 1981).

Consequently it is important to provide those children whose handicaps limit their functional skills with assistive devices that allow them to be active learners.

Ability Switches

The switch is the device used to control the technical aid. The technical aid is adapted to the specific abilities of the user by choosing a switch which the user can operate most efficiently. When the user's abilities change the switch can be replaced.

How to choose a switch

1. Determine which voluntary actions the user can reliably perform. These actions should not cause undue fatigue, compromise good muscle tone or cause pain to vulnerable joints. Chosen actions may include puffing or sipping or making a noise above a certain volume; although, arm, hand and head movements are preferable.

2. Choose the body surface the switch will be coming into contact with. In choosing the body consider:
   -which contact site gives the person best control
   -possibility of eliciting involuntary reflex
   -comfort

3. Choose the switch which will best accommodate the action and chosen contact site. Consider:
   -how sensitive does the switch need to be, how much force can the user consistently exert?
   -how large does the target or actuator need to be, how small an area can the user reliably target?
   -how much travel does the switch require? This refers to how far the actuator must be moved from the point when the person makes contact with the switch to the point when the switch is activated. Users who have a very small range of movement would require a switch with short travel where as users who have involuntary movement may require large travel to prevent unintentional activation of the switch.
   -is feedback required? Feedback is what informs the person that the switch has been activated. This is especially important for someone who has perceptual difficulties.
   -how durable does the switch need to be? This may need to be considered when the user cannot control the amount of force with which he or she activates the switch. In this situation a switch whose casing absorbs the unnecessary force may be appropriate. (Soft Switch or Flex Switch).

4. Choose the best position for the switch. The position should make best use of the chosen action and contact site. The switch should not be positioned too far away so that it is out of range nor should be so close that it will be unintentionally activated. The positioning of the switch should not interfere with other activities the user may wish to engage in, nor should it block vision. The position chosen as well as the switch chosen will determine what kind of switch mounting is required.

TECHNICAL AIDS AND SYSTEMS FOR THE HANDICAPPED INC. 1987 catalog

OTHER CONSIDERATIONS

1. Children with athetoid type of cerebral palsy may have better motor control, if some of their movements are restricted. These children frequently ask to have their arms held next to their bodies or on the armrest of the wheelchair using velcro cuffs. This provides greater stability and may improve control of distal movements such as the head or wrists. This should never be done without a consultation from a therapist and only if the child understands why it is being done and agrees to it.

2. Switch placement should not interfere with daily functions such as bathrooming or feeding, unless no other placement site can be found.

3. The switch itself should be cosmetically pleasing and placed in the least noticeable place.

4. If at all possible, the child should activate the switch using very little body movement. This should assist in reducing fatigue.

5. Switches which permanently mount adjacent to the child are preferred over ones which must be placed on the child. Switches such as the eyebrow wrinkle, eye direction and mercury switch, must be fastened to the individual. Therefore, evaluate these switches only if other switches are not successful. EXCEPTION: The infrared switch by Words + Inc., can be mounted on eyeglasses for eye direction activation. However, this same switch can be placed, for example, under a laptray of a wheelchair, and can be activated by moving an arm across the beam of the switch.

6. If possible, permanently mount the switch. People will be more encouraged to use it with a child if they are not responsible for putting it in place every time the child needs to use it.

7. What if a child is not able to successfully use any of the commercially available switches? This would be a rare situation, considering the variety of switches presently on the market. However, if it does occur, it might be helpful to obtain outside consultation from a Rehabilitation Engineering Center (refer to RESNA listed in Appendix F.) One could also present the problem to the vendors who supply technological devices to the handicapped such as Prentke Romich Company; Words + Inc; Zygo Industries, Inc. They are open to suggestions for new ideas and are valuable source of information.

ADAPTING BATTERY OPERATED TOYS
AN OVERVIEW

WHAT IS MEANT BY "ADAPTING" A BATTERY OPERATED TOY?

"Adapting" a battery toy refers to the technique of bypassing the toy's on/off switch with an adapter so that another type of switch can be plugged into the toy to make it work. For example, a large push-button switch could be plugged into an adapted toy, and the toy could be turned on by pressing the push-button. The toy would stay on as long as contact was maintained on the switch. Switches are available in many sizes, shapes and styles. Refer to Chapter Three for more information on switches.

Adapted toys can be used to:

1. Encourage independent interaction with a toy.
2. Evaluate a child's ability to control a switch.
3. Train in the use of a switch.

HOW CAN A BATTERY OPERATED TOY BE ADAPTED?

There are several methods for adapting battery operated toys. Two methods which are simple and reliable include:

Method #1: Permanent Adaptation
Method #2: Copper Wafer Adapter (Installed)

Specific directions for making these adapters are included later in this chapter.

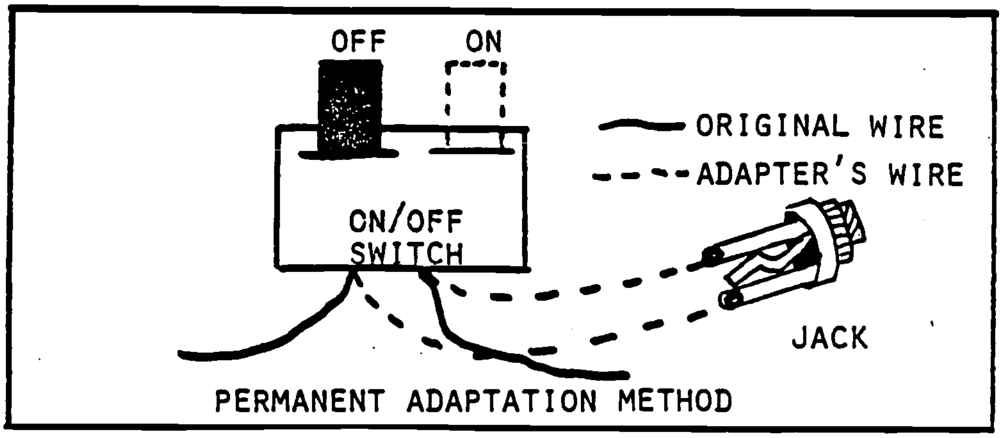
METHOD # 1. THE PERMANENT ADAPTATION

The Permanent Adaptation method requires you to get inside the toy and solder two wires "in parallel" or on top of the soldered connections where the wires come from the toy's on/off switch. The other ends of the added wires are soldered to a jack. The jack is mounted into the body of the toy and the new switch is plugged into it. This method is recommended if:

1. You can easily get inside the toy and locate the soldered connections where the wires come from the toy's on/off switch.
2. You are confident of safely soldering inside the toy.

The advantages of this method are that the normal operation of the toy is unchanged even though the adapter is in place, and it will work with any size or type of battery. This method is also the same one used to adapt the fire button on a joystick or a game paddle for switch control of the computer. This is described in Appendix I. The figure on the following page illustrates the Permanent Adaptation Method.

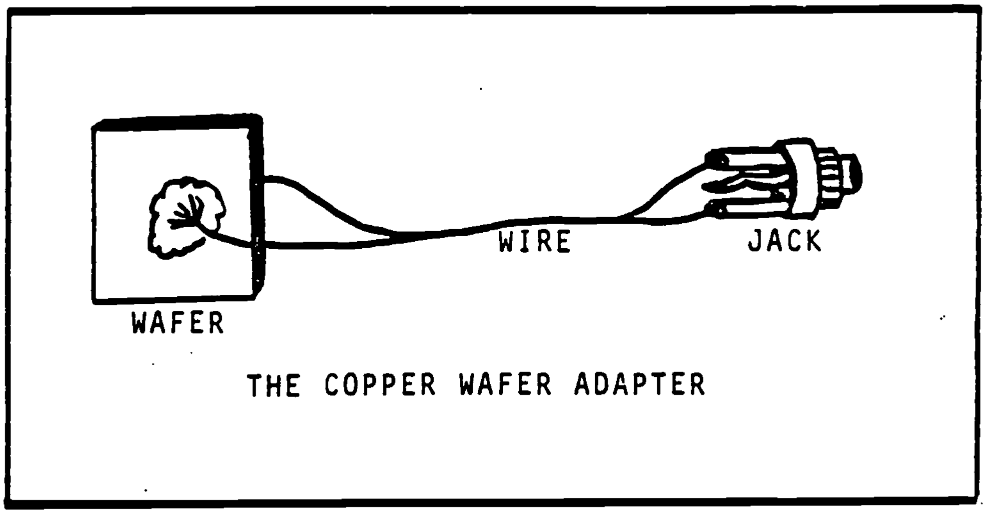
FROM TOYS TO COMPUTERS: ACCESS FOR THE PHYSICALLY DISABLED CHILD WHITE, C. & NOMURA, M.



METHOD # 2. THE COPPER WAFER ADAPTER (INSTALLED).

This method uses a copper wafer which is soldered to one end of a pair of wires with a jack soldered to the other end. The term "wafer" might imply that it is made from one piece of solid copper. This wafer, however, is made of double sided, copper clad board, which is available at Radio Shack. It is actually a piece of board sandwiched between two pieces of copper. Therefore, a wafer made from a solid piece of copper will not work. The copper wafer is placed inside the toy's battery compartment between the battery and its metal contact. The jack where the new switch plugs into is mounted in the body of the toy. This adapter interrupts the normal circuit of the toy and replaces the original on/off switch with the new switch. Activating the new switch will turn the toy on, if the wafer is in place and the toy's original switch is left in the "on" position.

The copper wafer is considered "installed" because the jack is mounted into the body of the toy which makes this method more reliable. Continuous plugging/unplugging of a switch may pull on the jack and loosen the copper wafer out of place unless the jack is secured. See page 88.



TROUBLE SHOOTING

If the toy is not working with the adapters and the switch, check the following things.

1. Is the switch working? Try the switch with a tape player or another toy to determine if the problem is in the adapter or toy, not in the switch.

2. Is the on/off switch on the toy in the "ON" position?

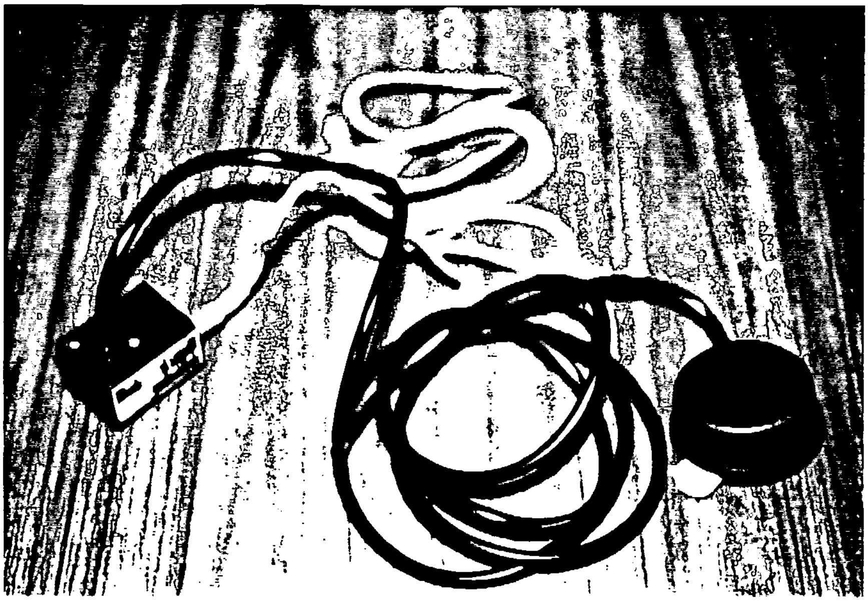
3. Do you have fresh batteries? Does the toy work without the adaptor?

4. Does the plug from the switch fit all the way into the jack? Screw the nut on firmly so the plug can fit all the way in the jack.

5. Are the terminals of the jack bent so they are touching each other or another wire?

6. Are all connections soldered well? Are any of the stripped parts of the wires touching each other or other metal parts of the toy that they shouldn't be? Cover these with tape. (It may be helpful to cut or file the plastic battery compartment to enable the wire of the copper wafer adapter to lie flat.)

SWITCHES



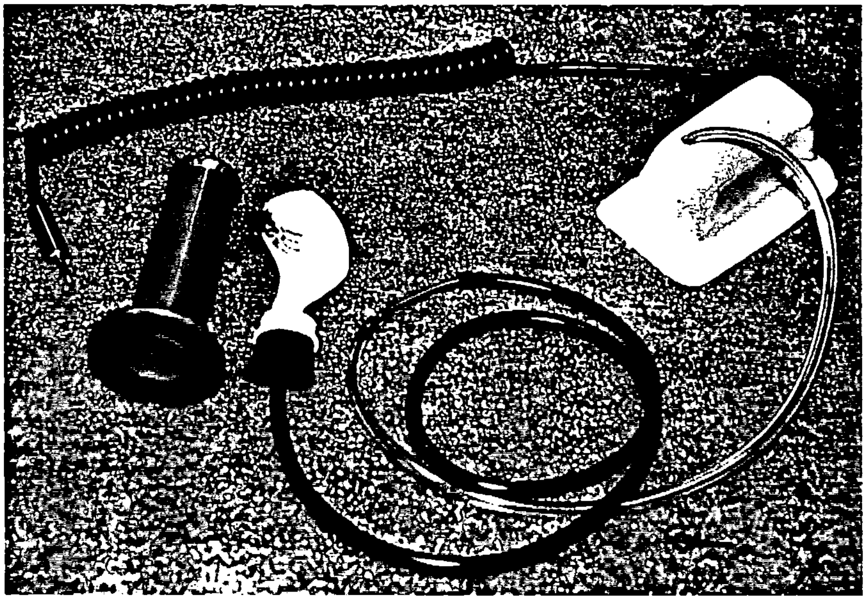
PRODUCT NAME: Air Cushion Switch

VENDOR: COMPUTABILITY CORPORATION, KANOR, PRENTKE ROMICH

COST: $92.00

Air Cushion Switch uses a small flexible bellows, which when depressed transmits a change in air pressure along a tube, activating a switch. It can be plugged into many devices, toys or computers and used in many different location sites for activation. It responds to slight pressure and provides no auditory feedback.

Since this switch can be used in so many locations it is a very practical switch for those children for whom auditory feedback is not important. It is especially nice to use around the face and head since it is a soft switch. It can be velcroed to a lateral head support for a quick and easy mount. It is equally easy to mount to a tray for a hand or arm operated switch.



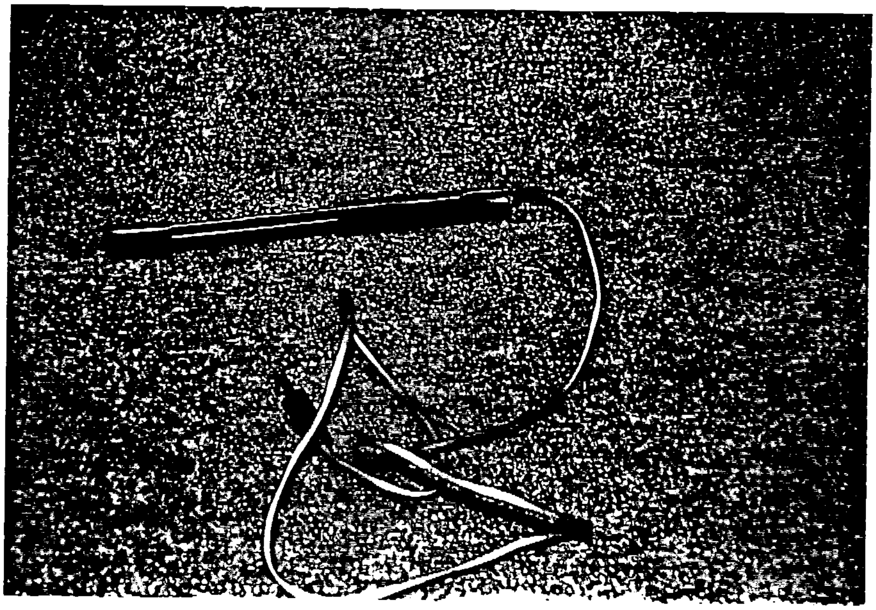
PRODUCT NAME: Balloon/Grip Switch

VENDOR: KANOR

COST: $45.00

Slight grasping pressure on the balloon or grip causes activation. The grip requires a stronger grasp than the balloon. This switch requires continued grasp to keep it on.

For many children the ability to sustain the pressure required for this switch is difficult. It may be helpful to use this grasp switch to activate a timer, which in turn can be set to run the reinforcer for a set period of time. It is very important to match the size of the grip to the size of the child's hand. This switch may also be used to work on pincer grasp.



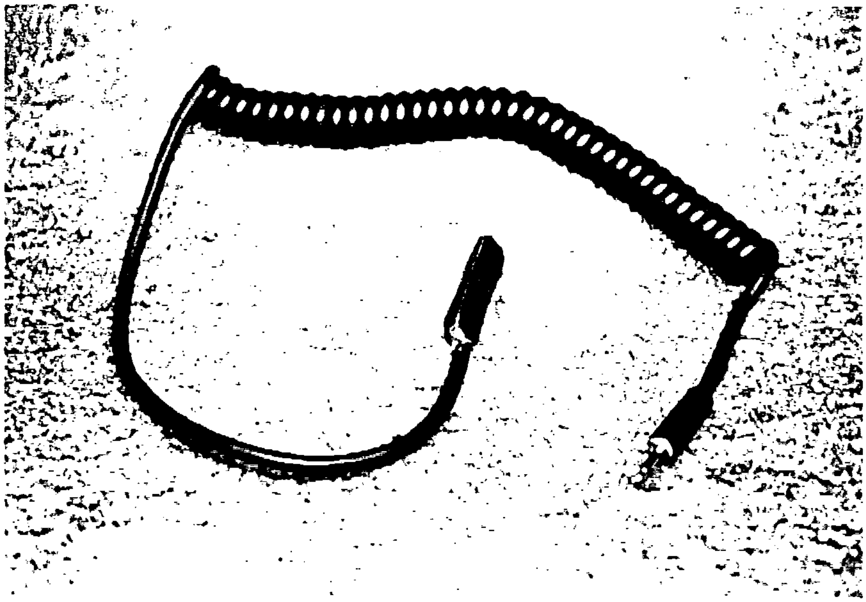
PRODUCT NAME: Leaf Switch

VENDOR: KANOR, ZYGO

COST: $25.00 to $55.00

This is a two-way deflection switch. The leaf is encased in a soft, non-abrasive red vinyl sleeve for use in tight access areas (between upper or lower arm and trunk, thighs, knees, under the chin, etc.). It requires a very slight movement. This switch provides no auditory feedback and little tactile feedback to the user. It does not work well with someone who has a good grasp or has strong movement patterns as it is a fragile switch and easily broken. the switch is activated by deflecting it either way from midline. Thus, the child can come down on the switch or up underneath the switch. When the switch returns to midline, it turns off. Zygo has both a standard size (6 1/2 inch) and a short leaf switch (3 3/4 inch).

This switch can be used as a head switch when mounted to a lateral head mount. It could be operated with the head or the chin. Using it around the face, care should be taken so that it will not poke the child if they lose head control.

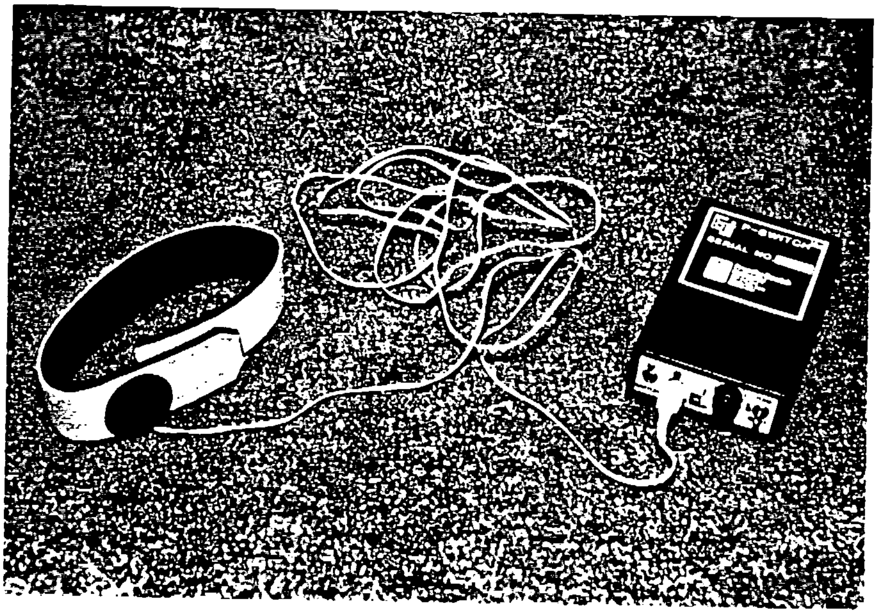


PRODUCT NAME: Mercury/Tilt Switch

VENDOR: KANOR, RADIO SHACK AND OTHERS

COST: $ 2.00 to $ 18.00

This is a gravity-sensitive switch. When tilted into the on position, the mercury makes contact with both wires in the capsule and it is turned on. The switches are sometimes difficult to position so that it goes on when the child is in the correct position. These switches may be more useful with limbs rather than head positions. Caution is required when the switch capsule is made of glass, which may be broken permitting the mercury to leak out.



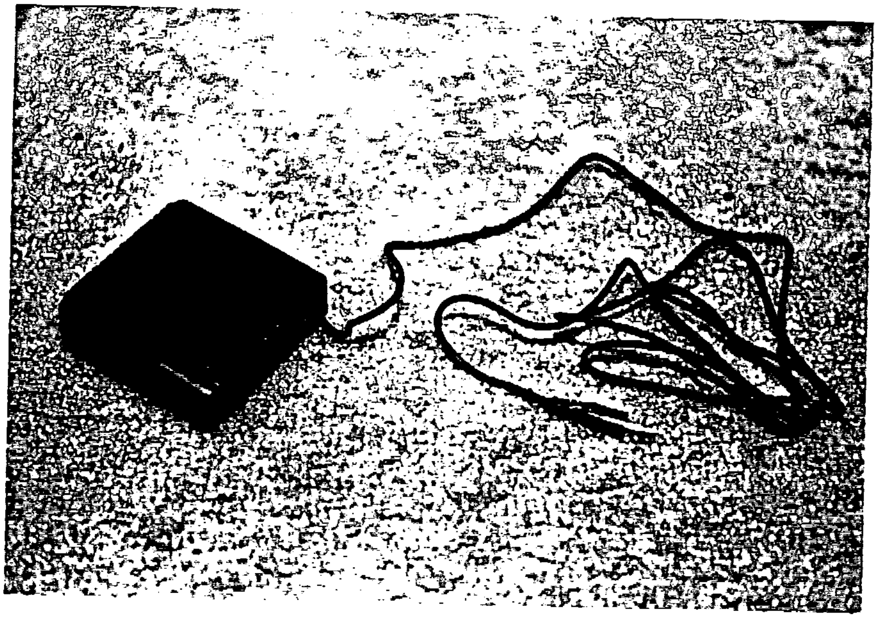
PRODUCT NAME: P-Switch

VENDOR: PRENTKE ROMICH

COST: $ 170.00

The P-Switch detects muscle movement and translates this movement into a switch closure that can be used to control various electronic devices. The sensitivity of the P-Switch can be set very high such that very small movements will produce a switch closure. Sensitivity can be adjusted lower so that only strong deliberate motions will trigger the switch while ignoring weaker movements. The P-Switch's switch closure is momentary and must be used with a timer to run devices.

The P-Switch sensors can be placed on virtually any part of the body where controlled motion exists. A headband is provided to mount the sensors to the user's forehead where eyebrow, forehead, and jaw movement can be detected. A second band is provided to mount the sensors to such areas as the ankles, wrists and arms. For areas where it is impractical to mount the sensors by the provided bands, paper medical tape can easily be used to secure the sensors to the user.



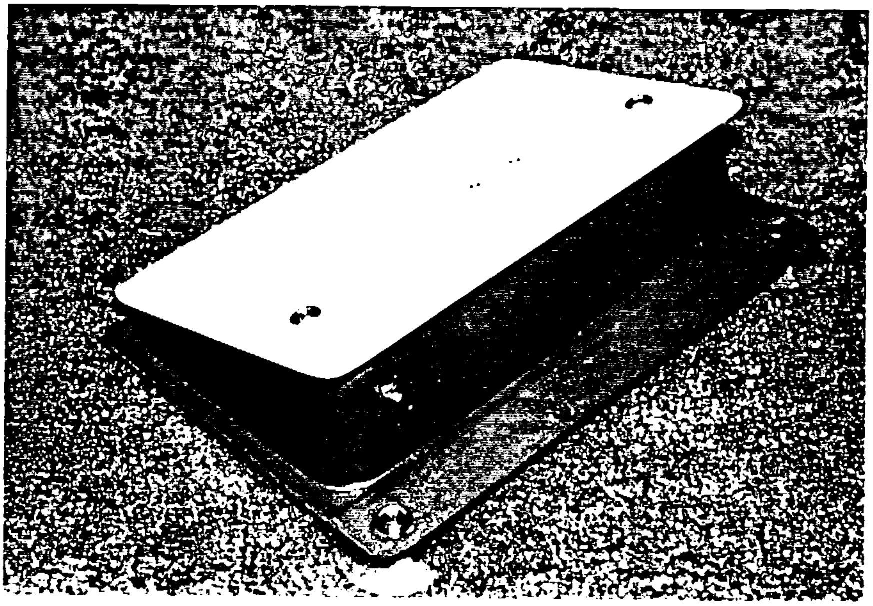
PRODUCT NAME: Tread Switch

VENDOR: TASH, INC., RADIO SHACK, ZYGO AND OTHERS

COST: $ 3.00 to $ 30.00

Tread Switch is a single switch operated by pressing the hinged top surface. It gives a click for auditory feedback.
The Radio Shack switch may be adjusted to reduce amount of pressure needed for activation. It has 2 screws along each side of the cover. Once these screws are removed, take off the cover and take out the spring in each corner. Foam may be placed inside to control some of the extra movement. Be careful not to cover the level switch. Replace the cover and the four screws. This switch now responds to very light pressure. The Radio Shack switch will need an adaptor to plug into a standard jack. Other, more expensive, tread switches require no such modification.

Because this switch can be used in so many locations and can be adjusted for the amount of pressure required for activation, it is very versatile. Different textured surfaces may be added to top of the switch for choices for a visually impaired child. Pictures may be used on the surface of the switch so that a child can learn to choose which switch activates a particular toy.



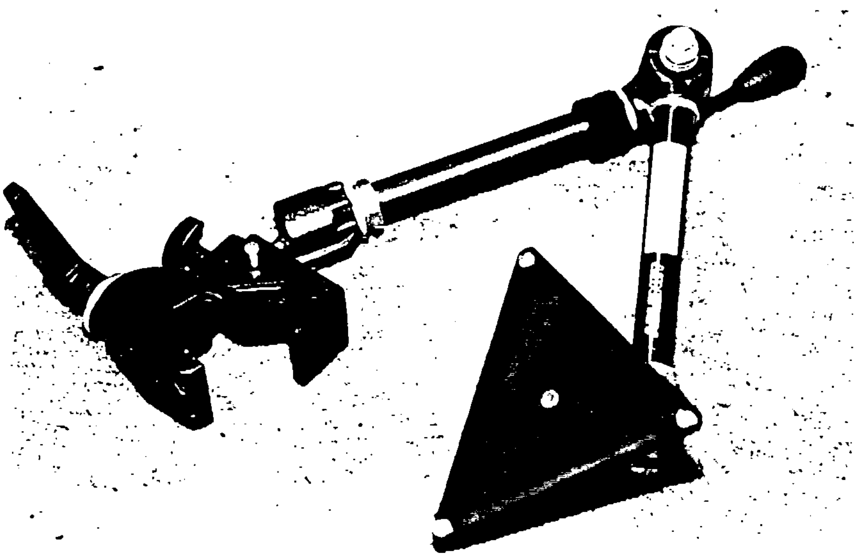
PRODUCT NAME: Vibrator Plate Switch (5" X 8")

VENDOR: KANOR

COST: $ 35.00

The brightly colored plate vibrates under slight pressure. It provided both tactile and auditory feedback. It will activate toys selected and plugged into the external jack, although some children enjoyed the vibration as a reinforcer. The user must push in the lower 2/3rds of the switch to get activation. It required two C batteries for operation and has two suction cups to prevent sliding.

ADAPTIVE DEVICES USED WITH SWITCHES



PRODUCT: Able Net Universal Switch Mount

VENDOR: ABLE NET

COST: $ 140.00

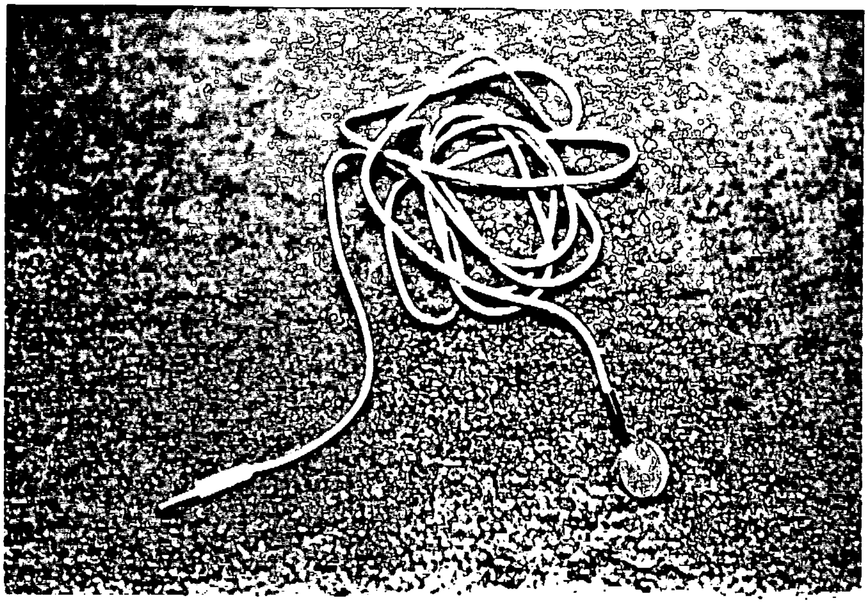
This product is a unique mounting system that allows switch placement in any position. Once the best position for the switch is determined, one handle will lock all the ball socket joints. It consists of an adjustable arm attached to a one-piece clamp which tightens onto a table or wheelchair. The switch plate will accept a variety of switches.

PRODUCT NAME: Adaptive Toys

VENDOR: STEVEN KANOR, DON JOHNSTON, COMPUTABILITY

COST: Varies with Toys

Toys may be purchased which have been commercially adapted. Toys may also be adapted with a battery adaptor or interrupter. (Directions for constructing adapters can be found in the first section of this booklet). Toys may also be adapted by increasing the area where activation occurs. Sometimes all that is needed is to increase the stability of the toy. This may be done by C Clamps, dycem, or even magnets glued to toys that can be used on a cookie sheet. Both chapters one and two of From Toys to Computers contain excellent photos and descriptions of adapted toys.



PRODUCT: Battery Adapter

VENDOR: JOHNSON, ZYGO, AND OTHERS

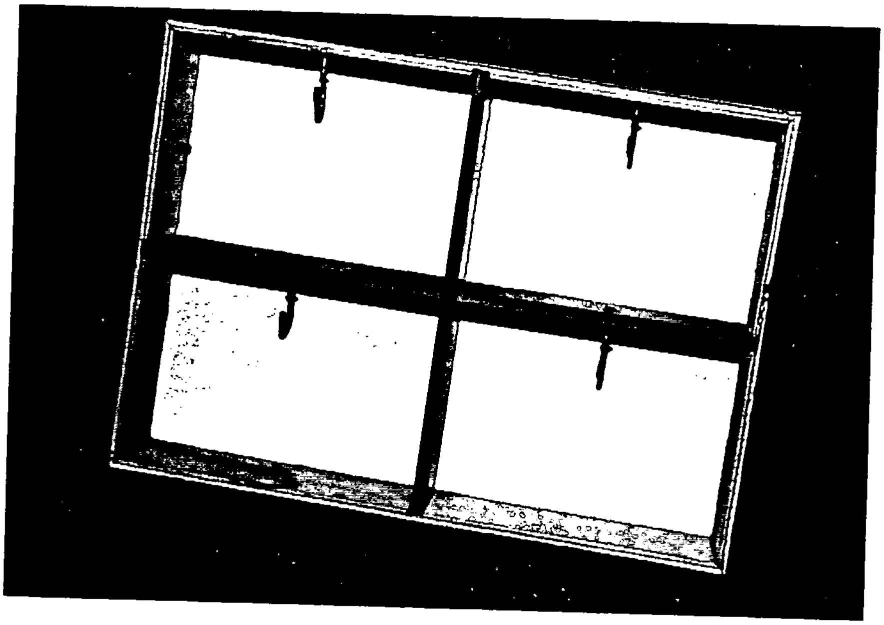
COST: $ 10.00 to $ 20.00

The Battery Adapter is used to connect switches to battery-operated devices such as toys, radios, or tape recorders, thus allowing an individual to use a switch to operate a device rather than using the controls housed on the device to operate it. Battery Adapters are an aid for teaching cause/effect relationships as well as switch training.

The Battery Adapter will work with any toy that is battery-operated and that has a simple "on/off" switch. Battery Adapters are not readily compatible with toys which have a joystick or which have multiple switch controls.

To install the Battery Adapter, insert the small copper disk between the battery and the battery conductor. Switch on the device to "on". This interrupts the flow of electrical current through the controls on the device thus allowing the device to be turned on by the switch that is connected to the Battery Adapter. For maximal convenience as well as ensuring longer service, use a separate Battery Adapter with each device. Be careful not to bend where the disk is connected to the wire.

Even though there might be enough power in the battery to operate the device when NOT in using the Battery Adapter, full battery power is needed to operate a device when using the Battery Adapter. For example, if the Battery Adapter does not activate the device and if the batteries are checked for power, there might be enough power to operate a device directly but not when operating it through the Battery Adapter.

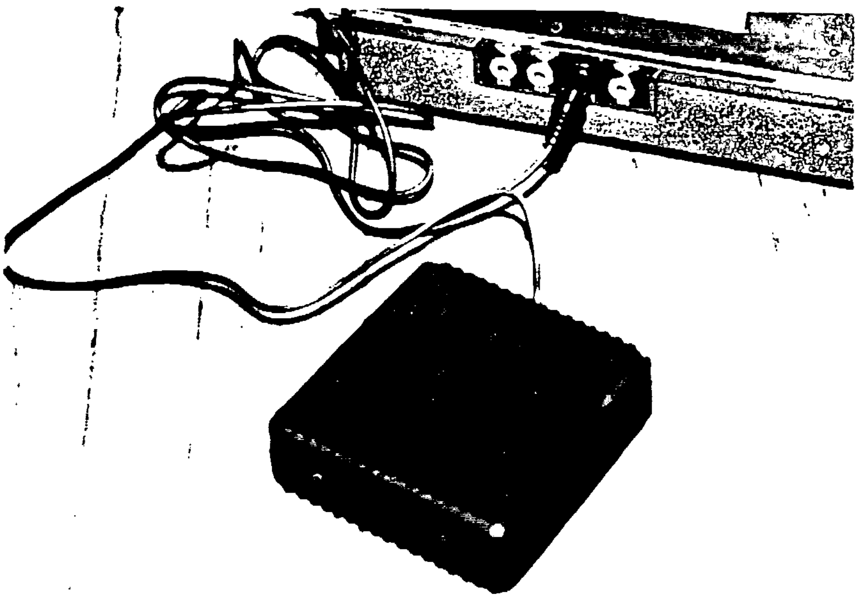


PRODUCT NAME: Choice Box

VENDOR: HOMEMADE

COST: Varies

Any type of arrangement may be used to help students conceptualize choice. The number of choices and symbol level may be determined by the teacher. The box may display two symbol levels at once (pictures behind real objects) to help transition across symbol systems. Some choice boxes have been as simple as masking tape across a cookie sheet.



TAPE RECORDER WITH A SWITCH

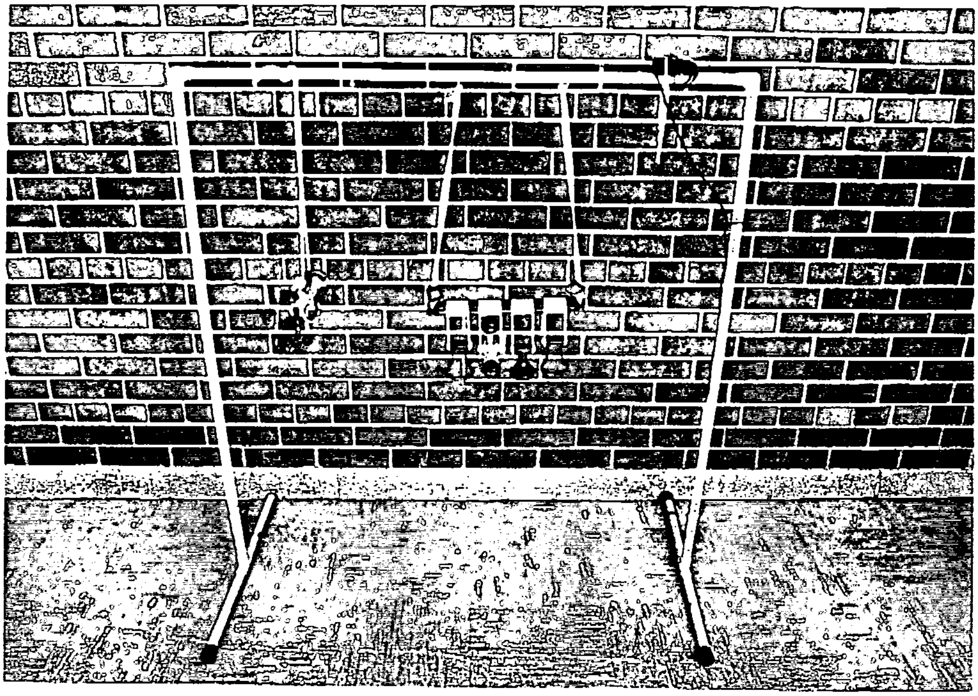
Any tape Recorder that has a remote control jack is easily controlled by a switch with a subminiature size phono plug. With a switch the child can control music, tapes made by family members, or prerecorded messages. Continuous loop tapes may be used to develop a calling system or relay simple messages. The switch is plugged into the remote control jack and the recorder is turned on in the usual manner. The tape will play as long as the switch is depressed.

PRODUCT NAME: Timer Module

Vendor: KANOR, ABLE NET

COST: $ 42.00

When a switch is connected to this module, the device output can be controlled. The time the reinforcer runs can be set from a few seconds to over a minute. Use of a timer helps those children who cannot maintain contact with the switch long enough to enjoy the reinforcer. Timers are available for both battery powered devices and 110 volt items.



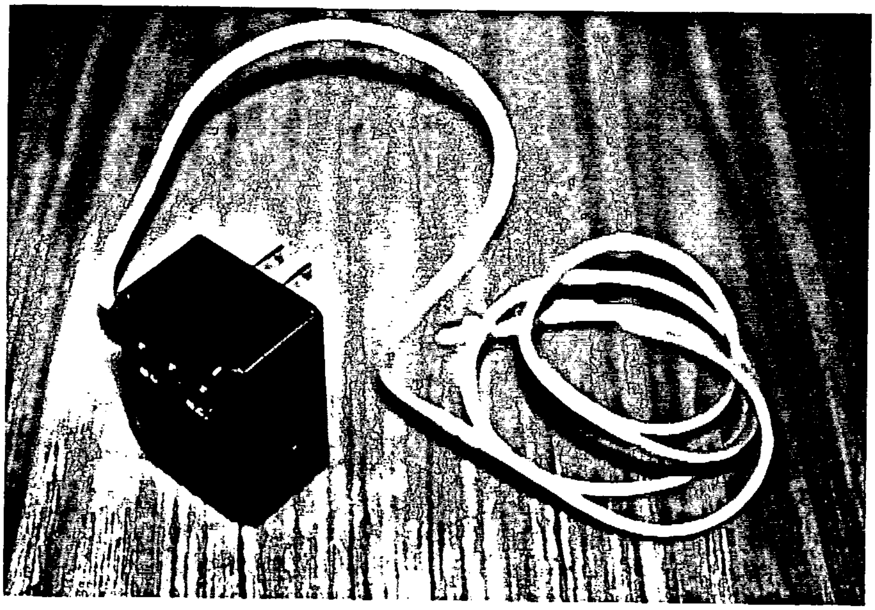
PRODUCT NAME: Toy Frame

VENDOR: Homemade, Small Commercial Ones for Babies

COST: $15.00 (depends on size)

Toy frames are constructed from either PVC or CPVC pipe. The pipe and the elbows needed are available in many hardware stores. A standing frame can be constructed to fit on a wheelchair tray or table top. This can be clamped to the horizontal surface. It can also be made to extend from the floor so that a wheelchair can be rolled up to the frame. Materials appropriate to the child's interest and developmental level can then be attached to the frame. These frames can be used to accommodate more than one child at a time to assist in developing opportunities for interaction. They have helped children to develop two-handed activities and are very useful for the child that must be positioned in a supine or side-lying position. Materials suspended from the frame can be adapted to match the activity of other children in the room or be adjusted to the individual child. If the child is ready for relating objects, for instance, a dolly may be attached in the middle and objects to interact with the doll are suspended on each side.

This unit may also become the support for various switch mountings. Switches can be velcroed to the side supports or hot glued to the top of the frame. One teacher created a pull switch by gluing a tread switch to the top and then glueing a band across the tread switch. The ends of the band were left long so that a ring could be tied at the correct height for the child's reach. The tread switch may be seen on the upper right hand corner of the toy frame. The yarn band is wrapped around the switch and the ring is not attached at this time.

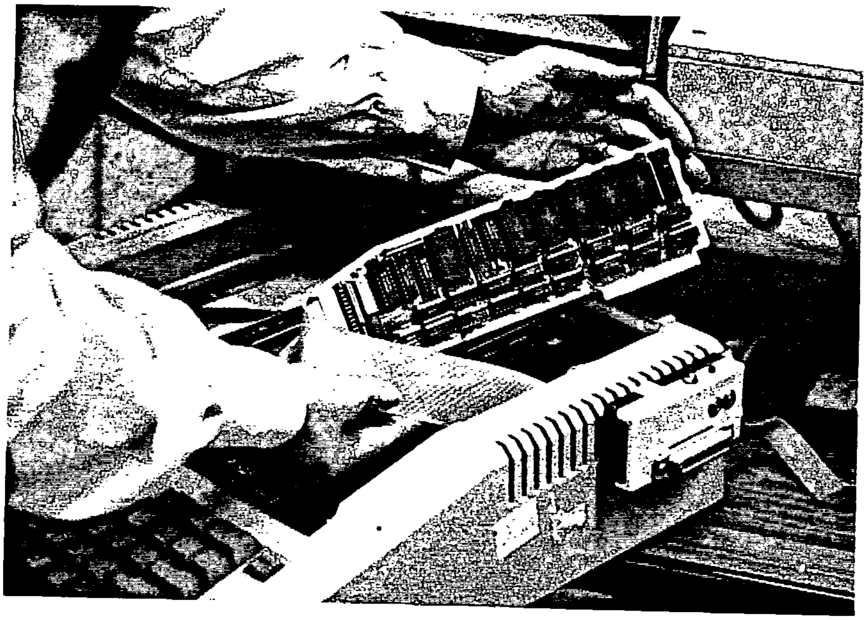


PRODUCT: 110 Volt Remote Control Relay

VENDOR: REHABILITATION EQUIPMENT SYSTEMS

COST: $ 29.00

This device plugs into a wall outlet and has a jack that will accept switch input. This will allow appliances like lights, record players, blenders, etc. to be plugged into the box and then be controlled by a switch.



PRODUCT NAME: Adaptive Firmware Card

VENDOR: ADAPTIVE PERIPHERALS, INC., DON JOHNSTON

COMPUTER: APPLE II+, APPLE IIe, APPLE IIGS

COST $ 400.00

The Adaptive Firmware Card allows the physically disabled to access regular software using any of sixteen special input methods. These special input methods include single switch, and dual switch (scanning and Morse Code), expanded keyboard capabilities, and keyboard assisting features for individuals using a headpointing device or a single finger. The Adaptive Firmware Card also allows game paddle emulation and a slowdown mode, allowing the user to operate some arcade-type games with one or two switches. The Adaptive Firmware Card does not interfere with the use of regular software or the Keyboard.

Special feature software is included. The Adaptive Firmware Card is compatible with software using the Language Card (Pascal, etc.) and is compatible with the Z-80 (CP/M) included with the Adaptive Firmward Card.

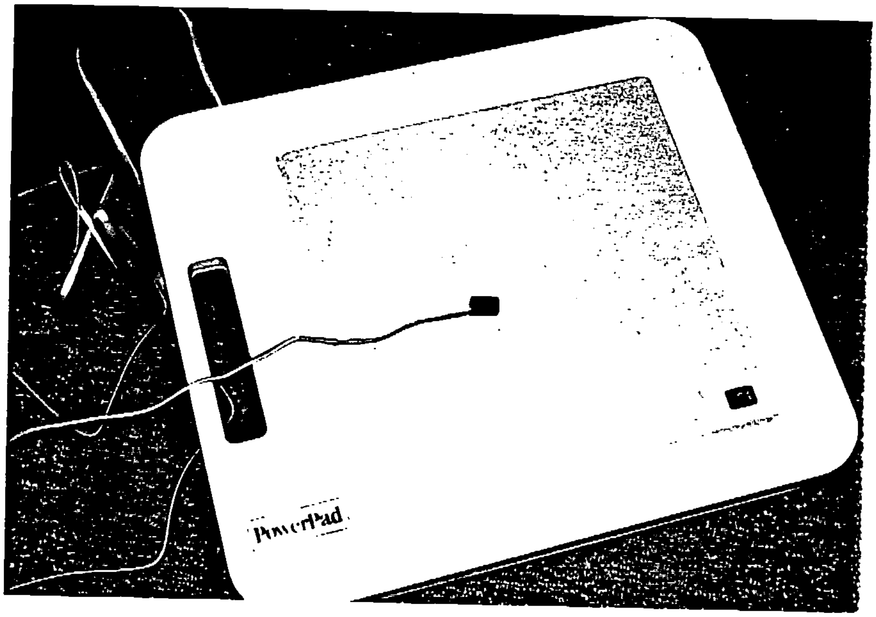
PRODUCT NAME: Echo+

VENDOR: STREET ELECTRONICS, LAUREATE LEARNING SYSTEMS, INC., DON JOHNSTON

COST: $130.00 to 160.00

The Echo allows the computer to produce synthesized speech. It uses a card that goes into a slot on the mother board. The card is attached to an external speaker. It can be adapted for use with headphones. (Shown card removed from computer with speaker still attached.)

Echo is compatible now with Apple IIe and Apple IIGS. Echo IIb is compatible with the Apple IIe, IIt and IIGS.



PRODUCT NAME: Power Pad

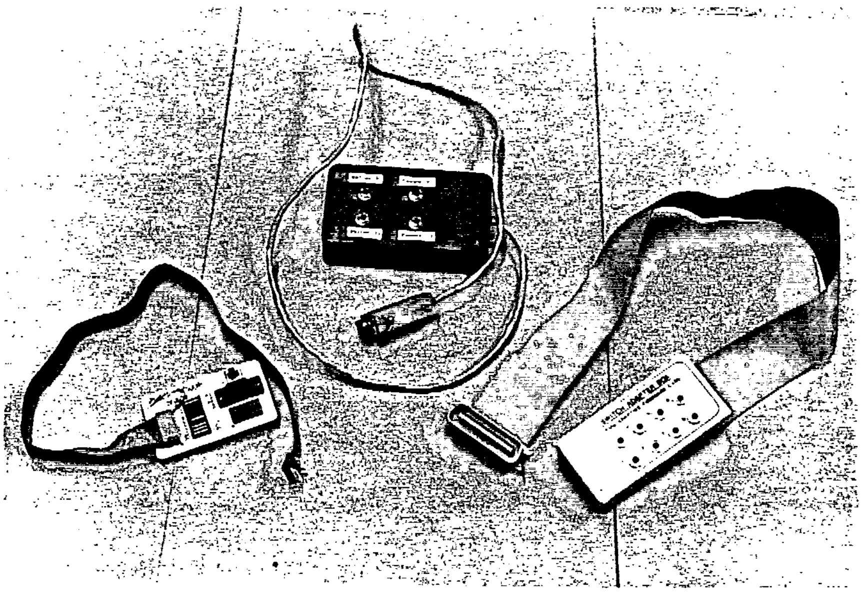
VENDOR: DUNAMIS, INC., DON JOHNSTON AND OTHERS

COMPUTER: APPLE II+, APPLE IIE, ATARI 400, ATARI 800, COMMODORE 64, IBM PC Family, TRS-80 COLOR, VIC 20, APPLE II GS.

COST: $100.00

The Power Pad provides an alternative way to operate the computer for children who cannot use the keyboard. Depending upon the software program used, the surface of the Power Pad (12" X 12" touch sensitive surface) can be divided up many ways yielding different sized activation areas. Overlays can then be custom designed to indicate what each "key" on the Power Pad signifies in that program's configuration.

The Power Pad connects to the I.O. port of most computers. Programs are available for the Power Pad which can be used for augmentative communication, rehabilitation training or education, drawing, and simple childhood songs. Lincoln Public Schools has copies of Morning Song and Wheels on the Bus. UCLA's computer program has developed many software programs. Authoring programs are also available for creating one's own programs. Lincoln Public Schools has one called Peek and Speak produced by Project ACTT. (Be sure there is a cord with the Power Pad to attach it to the computer.)



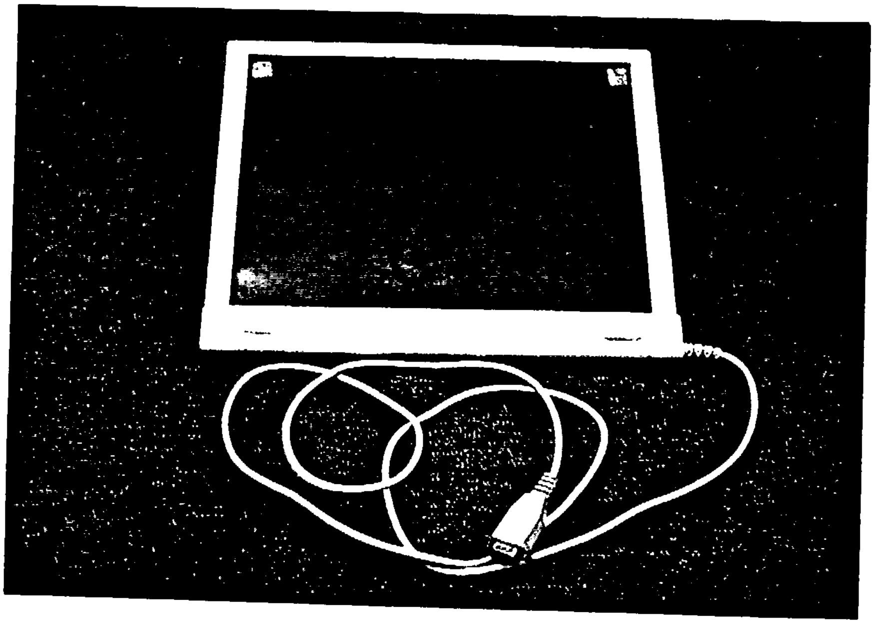
PRODUCT NAME: Switch Interface Adaptors (Scooter, Paddle Addaple Multiple Switch Boxes)

VENDOR: Don Johnston, Local Computer Stores

COST: $38.50

External interfaces allow switches, power pads, or joysticks to be installed without opening the computer each time a device is connected. It makes it easier to connect and disconnect the device and minimizes the risk of damaging that device's plug. External interfaces can be purchased that allow both sixteen pin input to the I/O port and the joystick port input on the same adaptor.

There are also devices which may be purchased that can be plugged in to the computer and then have jacks which may be used for single switch input to run appropriate software.

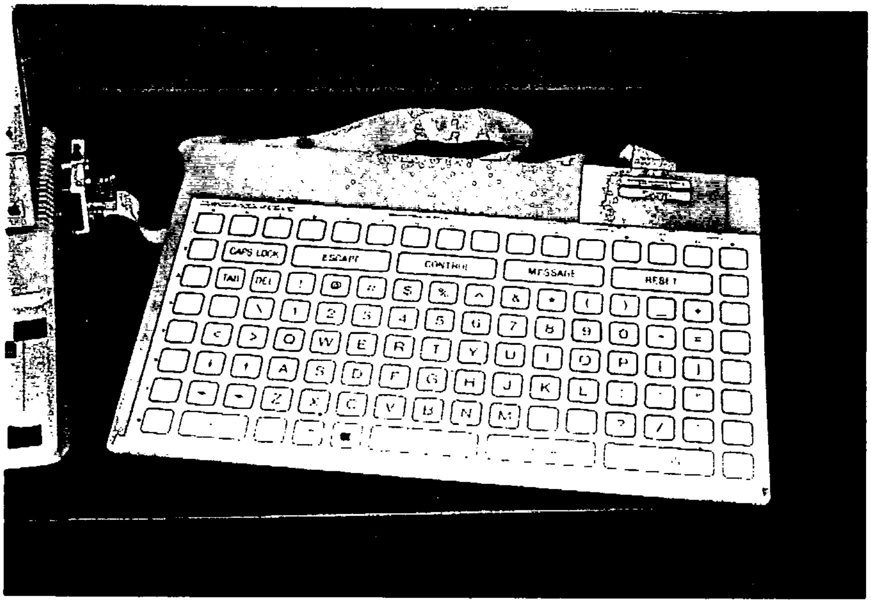


PRODUCT NAME: Touch Window

VENDOR: EBSCO CURRICULUM MATERIALSEDMARK CORPORATION, LAURENTE LEARNING SYSTEMS, INC.

COST: $200.00

The Touch Window is a piece of hardware that velcros over the screen of the monitor. With appropriate software, the monitor screen becomes the input mode. This allows the child to look at and touch the same location and then watch the animation. Removed from the monitor, the Window becomes a graphic tablet for drawing and designing. The Touch Window works with all Apple II series computers. An adaptor cable is required for Apple II+.



PRODUCT NAME: Unicorn Expanded Keyboard

VENDOR: Unicorn Engineering Company

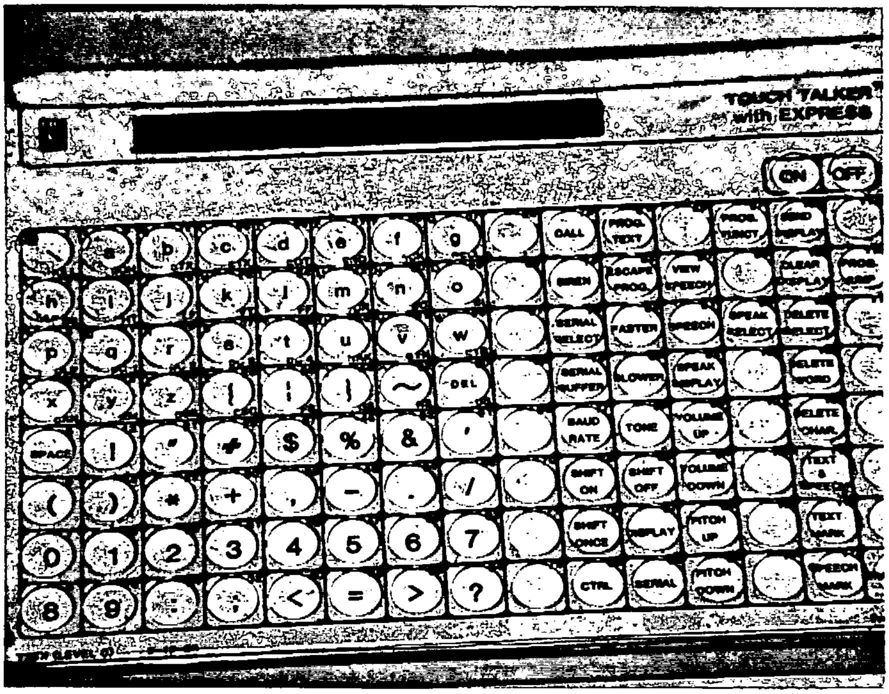
COMPUTER: APPLE II+, APPLE IIE, APPLE IIGS

COST: $300.00 to $350.00

Unicorn Expanded Keyboard is a programmable membrane keyboard with 128 touch-sensitive areas ("keys"). Any key or group of keys can be defined by the user to represent any message up to 40 characters long. Custom keyboard layouts can be stored on disk and used when desired. Custom overlays are then created for each layout.

Any symbol may be used on the overlay from color photographs to the printed word. The board can be programmed to adjust the acceptance time. (Acceptance time is the amount of time needed to maintain contact with the surface at a particular point.) For those children who briefly touch the surface several times before they make their final selection, this feature allows them to use this board. The board comes with two disks that give step-by-step procedures for creating custom layouts.

An Adaptive Firmware Card is required to use the Unicorn with Apple computers. Standard software can be used. Thus programs like Stickybears ABC can be adapted so that the Unicorn board becomes the input rather than the keyboard. An Echo voice output device must be installed in the computer to get speech output with the customized layouts. Ten overlays with transparent sheet covers are provided; others are available. Keyguards are also available.



PRODUCT NAME: Touch Talker

VENDOR: PRENTKE ROMICH COMPANY

COST: $ 1,955.00 (Hardware only)

The Touch Talker is a portable communication aid offering output through synthesized speech, LCD display, optional printer, or computer keyboard. It is a direct selection device used by pushing the keys on the membrane keyboard. Messages are displayed on the LCD as they are created and spoken with either the "Speak Selection" or "Speak Display" key. The Touch Talker can be used with either Express or Minspeak software. The choice of software, along with the synthesized voice chosen, will determine the final cost. Express software allows vocabulary to be stored through a leveling technique (128 locations on 99 levels). Icons, which may represent many different concepts, is used to store vocabulary with Minspeak. The Touch Talker can also be used to operate an environmental control system. Kits can be purchased to change the 128 locations to either 8 or 32 sites for activation. A memory Transfer Interface can be purchased which allows vocabulary to be stored on an MTI Apple disk.

BOOKLIST

<u>ACTT STARTER KIT</u>
Macomb Projects. Western Illinois University, Macolm, Illinois 61455

<u>ADAPTIVE PLAY FOR SPECIAL NEEDS CHILDREN</u>
Caroline Ramsey Musselwhite, College Hill Press. Inc.

<u>AUGMENTATIVE COMMUNICATION: ASSESSMENT RESOURCE</u>
Goosens & Crain, Don Johnston Developmental Equipment, 900 Winnetka Terrace Lake Zurich, Illinois 60047

<u>AUGMENTATIVE COMMUNICATION: INTERVENTION RESOURCE</u>
Goosens & Crain, Don Johnston Developmental Equipment, 900 Winnetka Terrace Lake Zurich, Illinois 60047

<u>COMMUNICATION, CONTROL AND COMPUTER ACCESS FOR DISABLED AND ELDERLY INDIVIDUALS:</u> Bradenburg & Vanderheiden, College Hill Publication, 1987. A three volume series.

<u>FROM TOYS TO COMPUTERS: ACCESS FOR THE PHYSICALLY DISABLED CHILD</u>
Christine White O.T.R., Mari Nomura O.T.R.
Christine White
P.O. Box 700242
San Jose, California 95170

SOURCES FOR SWITCHES

ADAPTIVE PERIPHERALS, INC.
4529 BAGLEY AVENUE NORTH
SEATTLE, WASHINGTON 98103
(206) 633-2610

COMPUTABILITY CORP.
101 RT 46 EAST
PINE BROOK, NEW JERSEY 07058

DON JOHNSTON
DEVELOPMENTAL EQUIPMENT INC.
P.O. BOX 639
1000 N, RAND ROAD
BUILDING 115
WAUCONDA, ILLINOIS 60084
(312) 526-2682

DUNAMIS, INC.
3423 FOWLER BLVD.
LAWRENCEVILLE, GA 30245
(404) 923-3202

PRENTKE ROMICH COMPANY
1022 HEYL ROAD
WOOSTER, OHIO 44691
(216) 262-1984

RADIO SHACK
FOOT PEDAL SWITCH FOR TAPE RECORDER

ZYGO INDUSTRIES, INC.
P.O. BOX 1008
PORTLAND, OREGON 97207
(503) 297-1724

STEVEN KANOR, PH.D., DIRECTOR
SPECIAL TOYS
385 WARBURTON AVE.
HASTINGS ON HUDSON
NEW YORK 10706
(914) 478-0960

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