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ABSTRACT

This research proposal reviews the literature on the development of mobility skills in students with severe physical disabilities and proposes a single-subject study, using a multiple baseline across subjects design, to evaluate effects of the Mobility Opportunities Via Education (MOVE) Curriculum on the mobility skills of sitting, standing, and walking and on social interactions of subjects. The literature review examines the relationship between motor development and cognitive development, the role of the environment, the "zone of proximal development" and motor development, and the interventions of structured guidance and sensory stimulation. The need for evaluating the effect of the MOVE Curriculum on the development of functional mobility skills is explained. The proposed study would involve provision of training in the MOVE Curriculum to teachers that serve students with severe physical disabilities, selection of four to five such students, definition of functional mobility for each child, application of the curriculum, and evaluation. (Contains 12 references.) (DB)

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Promoting Motor Skill Development Through the MOVE Curriculum

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Abstract

One of the most fundamental goals of educating students with disabilities is increased independence to promote integration into life activities. Students with physical disabilities are often faced with the challenge of developing mobility skills in order to gain greater access to their communities and increase opportunities to interact with others. This single-subject study will address the effects of the Mobility Opportunities Via Education (MOVE) Curriculum on the mobility skills of sitting, standing, and walking as well as social interactions for students with severe physical disabilities. A multiple-baseline design across subjects will be employed. It is expected that the structured guidance and environmental adaptations provided through the MOVE Curriculum will increase functional mobility skills for students with physical impairments thus increasing their opportunities for social interactions.

Promoting Motor Skill Development Through The MOVE Curriculum

The relationship between motor development and cognitive development remains a debated issue in the fields of education and psychology (Mandler, 1992; Bebko, Burke, Craven, & Sarlo, 1992; Horn, 1991; Notari, Cole, & Mills, 1992; Coggins & Sargent, 1992). Piaget's theory of cognitive development has had considerable influence in this area (Beilin, 1992). According to Piaget, knowledge is acquired through the process of acting on one's environment. Motor activities and physical interactions with the environment are necessary for the development of such skills as object permanence, causality, and spatial relations (Mandler, 1992). More specifically, during Piaget's sensorimotor period, an individual senses his environment and then acts upon it (motor behaviors) resulting in intellectual growth. Thus, according to Piaget, motor activity is a necessary prerequisite to cognitive development.

Bebko et al. (1992) explored alternative pathways to development de-emphasizing motor activity as a necessary prerequisite to cognitive development. His review was in response to a number of studies describing individuals with severe physical impairments who had age-appropriate or only slightly delayed cognitive development. Two alternative theories examined by Bebko et al. are the perceptual analytic and neo-Piagetian models. While both of these theories acknowledge motor activity as a possible means of cognitive development, they do not consider it to be a prerequisite contributor as does Piaget.

Mandler (as cited in Bebko et al., 1992) supports a perceptual-analytic view of development that refutes the idea that symbolic representation develops from a prior action-based system. Rather, Mandler proposes that symbolic representation develops simultaneously with an action-based system. Infants are described as being born with the ability to engage in perceptual-analysis of their environment

where perceptions are actively compared with one another. It is through this analysis of perceptual experiences and not necessarily physical interactions with the environment that children develop concepts. Mandler recognizes that sensorimotor activity may provide one form of input for the perceptual system, but argues that symbolic thought could exist in its absence (Bebko et al., 1992; Mandler, 1992).

A second alternative explored by Bebko et al. (1992) is neo-Piagetian theories. These recent revisions of Piaget's theory support the constructivist nature of development, however, they emphasize internal activity much more than external action and manipulation of the environment. Just as Mandler's perceptual-analytic theory regarded motor activity as but one possible means of sensory input, neo-Piagetian theories support a representational system that is independent of the type of input received. Other theorists have suggested that the presence of at least one of three (sensorimotor, auditory, visual) means of input is all that is necessary for cognitive growth in individuals with severe physical impairments (Bebko et al.).

Notari, Cole, and Mills (1992) also investigated the non relationship between cognitive and motor development. Their work has focused on a relatively new practice called Cognitive Referencing. Cognitive Referencing is derived from the cognitive hypothesis model which is based on Piaget's conception of synchronous development across different domains. According to this practice, "children who have motor or language delays at a level equal to that of their cognitive skills are not considered to be language or motor delayed, even if their language or motor abilities are significantly below expectations for their chronological age" (Notari et al., 1992, p. 23). This widely accepted idea which lacks theoretical and empirical support is used in many states to determine eligibility for motor and language services. According to this practice, many children with less than average motor

and language skills are denied related services because of the misassumption that their motor and language development is determined by their cognitive development.

Notari et al. (1992) reviewed a number of recent studies that appear to dispute the validity of Cognitive Referencing. Cole, Mills, and Harris (as cited in Notari et al.) compared the effects of motor therapy on both children with higher cognitive than motor skills and children with equally delayed motor and cognitive skills. The results which indicated no significant differences in the effectiveness of therapy for the two groups clearly challenge the assumptions of Cognitive Referencing. Coggins and Sargent (1992) report that "children whose cognitive skills (as indicated by mental age) were equal to their language or motor age . . . made as much progress during treatment as children whose mental age was higher than their language or motor age" (p. 45) . Thus, empirical evidence appears to refute a unidirectional relationship between cognitive and motoric development.

Further, recent research describing a complex dynamic process of motor development emphasizes the importance of environmental influences on motor skill development (Notari et al., 1992; Thelen & Ulrich, 1991). In contrast to the traditional neuromaturationist theories of motor development, a dynamic systems theory proposes that new behaviors emerge from cooperative interactions of multiple components. While neurological maturation is recognized as one component of development, it is not given sole credit as in the more traditional motor development theories (Thelen & Ulrich, 1991).

Thelen and Ulrich (1991) describe a dynamic process for learning to walk which emphasizes the importance of many other factors like motivation, movement, posture, and balance in addition to neurological maturation. Thelen (as cited in Thelen & Ulrich, 1991) conducted a study of treadmill stepping in infants which compared the kinematic properties of leg kicks in 7 month old infants when they

were supine, held upright without a treadmill, and supported on a treadmill moving at two different speeds. Thelen found that the introduction of the moving treadmill as a system of support facilitated highly coordinated, alternate steps with adult-like qualities. However, when the infants were supported upright without the treadmill, they could neither walk, stand, nor perform stationary stepping movements. Thelen described this as a result of "hidden" abilities that can be elicited with appropriate environmental support.

Thelen and Ulrich's (1991) longitudinal study of the dynamic developmental process of locomotion in prelocomotor infants using a moving treadmill as an environmental support described infants as young as 1 month performing treadmill stepping when supported upright. However, these same infants did not begin walking independently until close to one year in age. Additionally, once alternate stepping was consistently established, several new conditions were introduced: changes in speed, weighting one leg, and conflicting speeds on a split-belt treadmill. In each instance, the prelocomotor infants were able to adjust their stepping to the new conditions the first time they encountered them on the treadmill. Thus, Thelen and Ulrich (1991) concluded that the results of this study support the notion "that upright locomotion emerges from the self-organization of multiple cooperating elements rather than as a result of a preexisting neural code specifying the outcome" (p. 81). More specifically, there appears to be a system for locomotion in place long before the behavior is independently performed. By manipulating the environment to support, assist, and motivate the infants, researchers were able to prematurely elicit this skill.

van Geert (1991) examined the relationship between a dynamic model for development and Vygotsky's zone of proximal development. According to Vygotsky, development is constantly evolving through the support of instruction, play, and assistance. Contrary to Piaget's idea that a child must reach the

appropriate developmental level before they are "ready" for instruction on a new skill, Vygotsky recognized a "zone of proximal development" (ZPD) in which children can be facilitated and guided through new skills before they appear "ready". Vygotsky recognizes two developmental levels: an actual developmental level revealed by the child's independent problem-solving abilities and a potential level of development revealed by problem-solving abilities under adult guidance. The distance between the actual developmental level and the potential developmental level is considered the zone of proximal development (Vygotsky as cited in van Geert, 1994). As the child is guided and assisted through the new skill, the distance between the actual and potential levels of development narrows, and the child internalizes the new skill. Once the child has completed the transformation, the potential level of development becomes the actual level of development.

Recent research has emphasized the importance of recognition of the ZPD for determining a child's readiness for learning (Burkhalter, 1995; Englert,Rozendal, & Mariage, 1994; Letto, Bedrosian, & Skarakis-Doyle, 1994). These studies examined the role of the teacher in facilitating the students through the ZPD. Burkhalter investigated the effects of teacher guidance in teaching preformal-operational children the task of persuasive writing which involves the formal-operational skills of formulating, analyzing, and synthesizing reasons. In Burkhalter's study, an experimental group of students was provided instruction and guidance on persuasive writing before being asked to write a persuasive essay while a control group of students was given no instruction or guidance before being asked to complete the same task. All experimental students scored significantly higher on the posttest than those students in the control group. Burkhalter concludes that instruction should not be kept from a child because teachers think it is too difficult. Children need to be guided through a sequence of increasingly difficult goals in order to move through their ZPD development to new levels.

Englert et al. (1994) investigated the role of the teacher in guiding a preconventional writer with a learning disability in readi` and composing meaningful, connected texts. More specifically, their study emphasized the effects of scaffolding on student progress. Scaffolding is described as forms of support provided by the teacher to a student in order to move him through his ZPD (Rosenshine & Meister as cited in Englert et al.). This technique of assistance is particularly important for students with disabilities since they often require more instructional support and guidance from teachers. Englert et al. described the importance of the teacher's role in finding the entry point to the student's ZPD, providing prompts and assistance to the student, and finally fading the assistance as the student's level of competence increases.

Another recent study investigated the effects of scaffolding or structured guidance on language acquisition in young children with cerebral palsy (Letto et al., 1994). Letto et al. referred to Bruner's (Burner as cited in Letto et al.) definition of scaffolding in which the caregiver adjusts the environment in order to permit participation in a communication event as the theoretical paradigm for their study. They specifically defined structured guidance as the provision of an augmentative and alternative communication device and collaborative interaction with an adult partner. The longitudinal study measured the effects of structured guidance or scaffolding on three main communicative functions (i.e., requests for action, requests for objects, and requests for attention) in a child with a severe physical impairment and no reliable or consistent means of interactive communication.

Letto et al. (1994) proposed that by actively participating in social interactions with a more skilled partner and with the support of an augmentative and alternative communication (AAC) device, a non-verbal child could increase communicative functions by progressing through the ZPD. Successful progression

through the ZPD was defined as a significant increase in the frequency of communicative initiations and generalization of these functions to new partners. Through appropriate adult assistance, the child will transition from interpsychological functioning in which adult guidance is needed to intrapsychological functioning in which the child's potential developmental level becomes his actual developmental level. However, Letto et al. recognize that some students, especially more severely impaired students, may take longer or may never reach independence at the potential developmental level. Nevertheless, these students are able to perform behaviors with adult guidance of which they might not otherwise be capable.

The provision of structured guidance for students with disabilities certainly applies to students with motor skill delays as well as students with significant delays in language acquisition. A review of the effectiveness of motor skills training approaches for children with neuromotor delays emphasized the use of adult guidance in four common therapy approaches: neurodevelopmental treatment, sensory stimulation, behavioral programming, and naturalistic training (Horn, 1991). Bobath and Bobath (as cited in Horn, 1991) stress the normalization of postural tone and postural reflex mechanisms in the neurodevelopmental treatment approach by using adult facilitation to inhibit abnormal patterns, normalize muscle tone, and stimulate equilibrium reactions. The adult's role is to provide hands-on support and guidance only as needed in order to accomplish these goals.

A second popular intervention, sensory stimulation, is designed to "integrate the sensory systems (vestibular, tactile, proprioceptive, olfactory, auditory and visual) by providing controlled or facilitated sensory inputs from multiple modalities . . ." (Horn, 1991, p. 186). Whereas the adult provides direct stimulation to the child in the sensory integration approach, the behavioral programming intervention

requires the adult to manipulate the environment using applied behavior analysis techniques to encourage the child to perform the new behaviors. Finally, naturalistic training not only employs similar applied behavior analysis techniques, but also stresses the importance of teaching skills in the natural environment using naturally occurring antecedents and consequences to encourage skill acquisition, maintenance, and generalization.

Although adult guidance is an important aspect of each of these training approaches, this in itself does not seem to be the determining factor for success. Englert et al. (1994) described the role of the teacher as not simply providing support, but providing support in meaningful activities. In Horn's (1991) review of empirical studies on motor treatment approaches, she describes the effectiveness of the behavioral approach in which manipulation of the environment to motivate the student to learn is a crucial aspect of the intervention. However, there has been infrequent empirical support for the neurodevelopmental approach in which the student is facilitated to perform developmental skills without concern for the student's interest. Unfortunately, the research on sensory stimulation and naturalistic training has been very minimal and informal to date.

With the empirical support for behavioral interventions for teaching motor skills to children and the limited, yet promising, studies on training in the natural environment, it is appropriate to investigate the naturalistic approach further. The Mobility Opportunities Via Education (MOVE) Curriculum is such a treatment program. It emphasizes the importance of providing appropriate guidance to students with physical impairments to assist them in performing meaningful mobility skills within everyday activities and environments (Blanton, 1990). This curriculum which is designed to teach the functional mobility skills of sitting, standing, and walking requires the adult to identify a student's current level of performance, determine necessary prompts and assistance to move the child to the next level,

and finally designate a plan for fading assistance as the child becomes more independent in performing the mobility skills. One of the most important features of the curriculum is choosing mobility skills that are meaningful to the family and child, and thus motivating to learn.

Since the inception of the MOVE Curriculum in 1986, this seemingly successful approach has spread to a number of classrooms for students with physical disabilities across the United States and throughout Europe. While testimony from practitioners and families as well as informal studies have praised the effectiveness of the curriculum, there has been little to no systematic research related to the effectiveness of this approach in teaching mobility skills. Therefore, the focus of this research will be to answer the following questions: 1) Is the MOVE Curriculum more effective than traditional approaches in increasing functional mobility skills (i.e., sitting, standing, and walking) for students with physical disabilities? and 2) Does the increase in functional mobility skills lead to increased social interactions?

A single-subject study will be conducted using a multiple baseline across subjects design. Training in the MOVE Curriculum will be provided to a group of teachers from local schools that serve students with severe physical disabilities. Approximately 4 to 5 students will be selected from these teachers' classrooms. Prior to the intervention, functional mobility goals (i.e., sitting, standing, and/or walking) and social interaction goals will be operationally defined for each child. Repeated measures on these goals will be taken prior to the introduction of the independent variable, the MOVE Curriculum. This curriculum which emphasizes the importance of teaching meaningful mobility skills in everyday activities will be introduced at different points in time for each subject. Repeated measures will continue to be taken throughout the study to determine the effect of the MOVE

Curriculum on the functional mobility and social interaction goals identified for each subject.

To date, the author has written and been awarded a small grant in the amount of $1998.00 in order to conduct this research. Training in the MOVE Curriculum will be provided to teachers this July as part of a Collaborative Training Institute directed by the author. However, teachers will be instructed not to implement the curriculum until the agreed upon time. Prior to the introduction of the curriculum, a review session will be held. The author will conduct school visits during the course of the experiment as well as videotape randomly selected intervention sessions.

This study is intended to show the effectiveness of the MOVE Curriculum on increased functional mobility skills and social interactions. The behavioral approach of the curriculum combined with teaching in the natural context is expected to be more effective than traditional, developmental approaches to teaching motor skills. In addition, it is expected that social interactions will increase since students will have more opportunities for interaction within their environments.

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