MAKING THE CASE FOR MOBILITY: ENHANCING OVERALL DEVELOPMENTAL SKILLS OF STUDENTS WITH PHYSICAL IMPAIRMENTS

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ABSTRACT

Children learn through movement and interactions with their environment and/or with others. For children who have physical limitations, this natural developmental process is affected. The use of assistive technology to enhance movement, communication, play and learning allows the child with physical impairments to learn in a more independent manner through exploration, involvement, and interactions with others. The authors observed heightened interaction and activity levels, as well as improvements in autonomy, communication, and cognitive skills in children with mobility impairment in a camp experience in which an array of assistive technology was available.

Cause and effect skills, communication, social engagement, autonomy and independence are all closely tied to motor development and the ability to move (Allen & Marotz, 2003; Diamond, 2000; Jones, Horn & Warren, 1999). Providing a child with the opportunity to move does more for the child than enhance movement. Through research and observation it has

been determined that when a baby begins to move about its environment, more than just motor development occurs (Allen & Marotz, 2003; Diamond, 2000; Jones, et al., 1999). Problem solving skills begin to develop as the child learns to roll over, gets into a sitting position, pulls to stand at a couch, and learns to walk. Eye-hand coordination is evident as the child reaches for his/her toes, or catches a ball for the first time. Communication is enhanced as the child moves about the environment to get what is wanted, or locates and brings an item requested by a parent.

But for the child who is unable to move about the environment and interact in ways that have been shown to promote overall development, skill development in many areas may be limited. The results of observational studies show that the child may be delayed in other areas such as cognition, communication and social skills as well as motor skills (Bigge, Best & Heller, 2001; Diamond, 2000; Jones, et al., 1999). As such, providing access to mobility to enhance learning becomes much more critical and a worthwhile goal for all children. This article discusses the many gains seen by this author in a group of children who attended a day camp designed to enhance mobility.

HOPE, Inc. was the sponsor of the *Magic Mobility* camp. HOPE, Inc is a non-profit organization dedicated to providing "moving experiences" to physically challenged children. HOPE provides pediatric mobility equipment offered through a lending library, with mobility camps offered yearly to allow children to try new equipment in a safe environment before they take it home for a trial (HOPE, Inc., n.d.). Donations to HOPE allowed for the purchase of adaptive equipment and items needed to engage children in a number of activities designed to have them move and use the various pieces of equipment (T-ball, parachute games, arts & crafts, etc.). HOPE also provided an occupational and/or physical therapist to assist at the camp, and has brought in mobility equipment from a variety of venders for children to use within the two-week period of the camp (subsequently dropped to one week due to finances and fatigue of the children with a two week session). Some of the vendors also came to camp, to provide "on the spot" adjustments as needed. This provided an opportunity for children, parents, and therapists to "try before you buy," which is essential for obtaining funding from many insurance companies and/or state or federal funding sources. The equipment was also then made a part of a local lending library, with loans of 12 to 18 weeks, depending on demand. The camp was free to children, with parents and siblings encouraged to attend with the "camper." Flyers promoting the camp were sent to physicians, school systems, and service organizations. Volunteers from the special education department of one of the local uni-

versities provided the majority of the help with positioning, and then played with the children to encourage movement and active engagement in structured and non-structured activities. This also provided the teacher candidates with an experience of working with parents, as the parents were actively involved on a daily basis. Equipment included high and low technology options: hand powered tricycles, three wheeled bicycles, a variety of walkers, mobile standing frames, go-bots and mini go-bots, power wheelchairs and scooters, as well as powered cars and go-carts.

The HOPE executive director loosely prescribed the schedule for a typical day at *Magic Mobility* camp. Each child's therapist and/or parent had previously provided information on diagnosis, motor needs and limitations, and basic goals they hoped the child would obtain by attending the camp. The camp therapists and the lead author reviewed this information, and then developed possible options for each child before the children arrived at camp. This allowed for an introductory "match" of a piece of equipment with a camper, and the assignment of volunteer helpers. The therapists at the camp then took basic measurements when the child arrived for camp, with follow-up measurements taken at the end of camp to allow for documentation of improvements in the child's motor skills. The choice of equipment was decided jointly by the OT/PT on site, parents, the volunteers assigned to the child, and the child (if able to communicate preferences). All requests for trying a piece of equipment were honored, and the vendors and therapists made every effort to adapt a piece of equipment to make it functional for the campers. For example, a power wheelchair was adapted with an empty 5 gallon ice cream container turned upside down and taped to the footrest, and two foam pads were taped to the back of the chair to provide a three-year old the support needed to try out the power controls. If a piece of equipment did not "match" a child, either because of ability or size, an alternative piece of equipment could generally be found that was more successful. A few of the children received structured therapy at the camp, but the majority of the campers were there to experiment with the available equipment. Therapists, teachers, and even grandparents came to camp to observe a child with various pieces of equipment to find a good match for the child's needs.

Once fitted into a piece of equipment, the volunteers engaged the children in a variety of activities planned for the day. This included a gross motor activity (T-ball, parachute games, obstacle course), an arts and crafts activity (painting a "wall," coloring with chalk or crayons on an easel), snack, and a group "fun" time, such as music or a presentation from a local petting zoo. The children were monitored for signs of fatigue or discomfort, and were given rest periods when needed, in addition to moving to a different piece of

adaptive equipment. For example, if the camper began with a piece of equipment that required extensive energy, the child would then be positioned in a piece of equipment the required less physical effort (moving from a mobile walker to a power go-bot).

Objectives developed by the OT's and PT's for the campers, based upon stated goals for the camp provided by HOPE, Inc., focused on motor skills, including skills such as (a) selection of appropriate equipment to enhance mobility, (b) achievement of adequate positioning and enhancing range of motion, and (c) determination of reliable points of access for switch operation. However, the authors observed children demonstrating more than just motor skills, but also a wide variety of other developmental skills. Children evidenced growth in autonomy, independence, communication, cognitive skills, and social interactions among campers, which they had not displayed before being fitted with a mobility aid. This correlated with known research, that mobility is important for all developmental skill areas (Allen & Marotz, 2003; Bigge et al, 2001; Diamond, 2000, Jones et al., 1999). The volunteers also reported increased motivation, "empowering students and decreasing the characteristics of learned helplessness and outer directedness" (Hamill & Everington, 2002, p. 128). Active participation allowed children to "form friendships, develop skills and competencies, express creativity, achieve mental and physical health, and determine meaning and purpose in life" (Law & King, 2003, ¶ 4).

Children need to be alert to learn. They must be able to attend to the environment and observe what is going on around them. Kathy was two years old and had been diagnosed with CHARGE syndrome. The lead author observed that she was basically asleep; efforts to alert her to her surroundings were seen to have little impact on her awareness. However, positioning her in a mini-Go-bot significantly increased her alertness level, as evidenced by watching her move about the environment. Her eyes were open, she pushed a jellybean switch to make the go-bot move, and she would stop to watch other children moving around her. (See photo 1) As such, Kathy displayed the concepts of cause and effect, social interest in other children, and heightened alertness, all skills that are precursors to learning (Allen & Marotz, 2003).

Garrett was 11 months old and diagnosed with Meylomeningocele. His mother indicated he had no feeling or control of his body below the waist, and was observed by the authors trying to move around his environment by pulling his body forward on his forearms. But he was significantly limited in his options to explore and learn. Garrett was positioned in a mini-Go-bot and given a jellybean switch. He quickly learned to go forward, was given a

Photo 1

second switch that would allow backward movement, and then graduated to a joystick. Turning corners was not a real strength, but he displayed intact cognitive skills to move about his environment. (See photo 1) For the first time, per parent report, Garrett was able to express typical one-year old traits, such as autonomy, exploration, complex thinking and learning, and the ability to go where he wanted to go, without being carried (Allen & Marotz, 2003).

The skill level of some of the campers had not been determined before they attended the camp, due to their limited mobility. For Tom, a three year old with a chromosomal disorder, his mother's goal was to determine if he knew cause and effect. The therapists and students from the university tried various options with regard to non-power equipment (including walkers, gait trainers, and tricycles). Tom demonstrated limited interest or involvement, and he readily communicated his displeasure with the pieces of equipment through crying, physically striking out, and reaching for his mother or camp staff to take him out of the equipment. Then he was positioned in a mini-Go-bot with a jellybean switch. Tom surprised everyone by traveling all around the gym of the building, stopping and starting at a variety of interests. He powered up to and stopped at this observer, then left to go check out the balloons hanging down from a clothesline. Tom very competently demonstrat-

ed his knowledge of cause and effect once the proper equipment and motivators were determined. Tom's improvement confirmed the findings of Hamill & Everington (2002) that motivation is a critical factor in the development of skills for children with special needs.

Allison demonstrated both cognitive and communication skills when given the power to move about the environment independently. She had just turned three and was diagnosed with Arthrogryposis. Allison's ability to move about the environment was limited to scooting on her bottom. She has limited use of her arms and hands, but was able to feed herself with proper positioning and equipment. Allison was also non-verbal, but did have a consistent yes/no response. She was positioned in a power wheelchair with head controls. Very quickly she learned where to press the control to go forward and backward, including maneuvering around corners and avoiding obstacles in her path. Of interest was the way she used the power chair to communicate with adults. For example, she wanted to ride in a wheelchair adapted fire truck carnival-type ride. The university student working with her opened the rear of the truck to allow her to drive into the ride, but instead, Allison turned the power chair around and parked next to the fire truck. Her volunteer quickly understood that Allison was saying she wanted to sit on the seat of the fire truck, not sit in the wheelchair.

Social interactions among the campers increased significantly when they were given the ability to move. Those who were more comfortable with their power equipment were observed by this author to urge on the other children who were new to the use of switches. (See photo 2) Eric, a six year old, diagnosed with Arthrogryposis, had been using a power wheelchair for about two years. One of the goals stated by his grandmother for him in coming to camp was to allow him to help others and increase his self-esteem. His "I can do it, you can do it" attitude was a great motivator for other children. This also gave him a sense of empowerment, something often missing in non-mobile students (Bigge, et al., 2001; Hamill & Everington, 2002).

The original clinical goals of the camp were met by most of the campers as documented by reports of the physical and/or occupational therapist working with them and report from parent and volunteers. Of the 25 full-time campers served at the camp, 92% found a "match" and selected a device to borrow through the lending library. The remaining 8% were properly fitted and used a device during camp activities for sensory-motor play and learning, but they did not select a device from the lending library; achieved their mobility goals with traditional mobility methods (walking, riding a bike/trike, etc.). Upon assessment of physical abilities and adaptations of devices, 100% of the campers were able to achieve proper positioning with

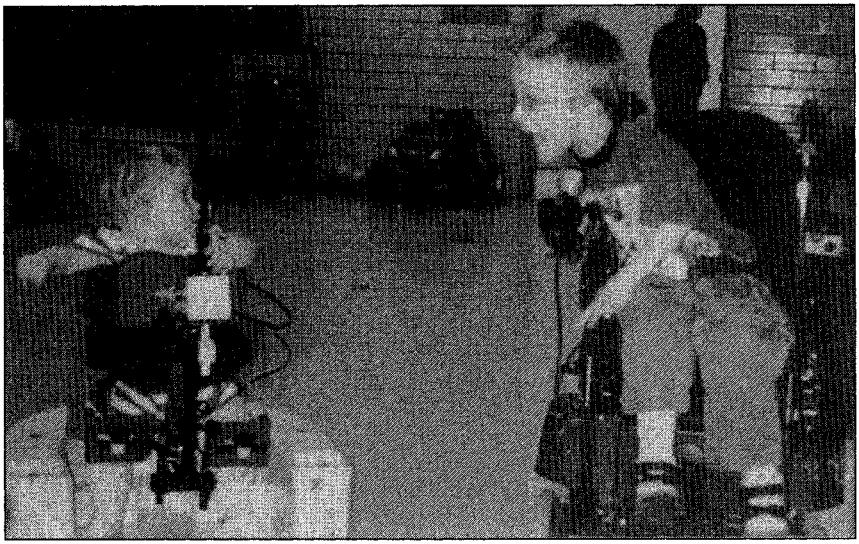

Photo 2

the selected mobility devices. This was obtained by the efforts of the many staff and volunteers who assisted in fitting and adjustments. Of the campers, 76% were identified as having range of motion limitations before coming to camp. All of these children were able to benefit from proper positioning to maintain or improve their overall range of motion through the use of the mobility device. This was the result of a prolonged passive stretch of muscles by being positioned in a piece of equipment, and being distracted by play activities and interactions that lead to the children remaining in the stretched position longer without complaint. Several children were also observed by the therapists to move more freely with greater balance and flexibility after using certain mobility devices.

All of the campers who participated in camp activities were identified with strength or endurance limitations by their parents or clinical therapists prior to coming to camp. Through proper positioning and alignment and appropriate equipment selection, 92% of the campers were able to maintain or improve their strength or endurance. As children were properly positioned in sitting and standing positions, they were able to bear weight on supporting musculature. This not only increased joint integrity and sensory awareness of their bodies in space, but it also provided an opportunity for children to gain strength in these muscle groups. With improved range of motion and strength, children were able to increase their tolerance for prolonged sitting and standing activities, and thereby increase overall endurance. A secondary benefit of proper positioning was the alignment of the trunk to achieve full

respiratory support. As children vigorously participated in activities, respiratory endurance was challenged. Upper body strength and endurance was also developed as children actively participated in play activities. The children also were more likely to be able to access play areas (60%), actively participate in play activities (88%), demonstrate independent use of a jellybean or joystick switch (84%, compared to 36% who arrived with this skill), and display increased independence, even if just for a few minutes. Those who did not meet the clinical goals were limited by the need to recover from surgeries, were ill, or for other reasons were not able to actively participate in the camp activities.

In summary, mobility has been proven to be important to the overall development of children (Allen & Marotz, 2003; Bigge, et al., 2001; Diamond, 2000; Jones, et al., 1999). This was demonstrated by a group of children with physical impairment who came to the camp where they were given the opportunity to try various pieces of adaptive equipment. When given the ability to move, these children were also observed to display autonomy, independence, cognitive/problem solving skills, and communication. These skills had not been demonstrated before, per parental and therapists reports, as the children did not have the physical means to let others know their developmental skill levels. Children learn through active exploration of their environment, but many of the children with physical impairments are not able to move independently. The lesson is that methods and options for non-mobile students to become mobile must be developed. This will enhance growth of cognition, language, and social skills for many students, in turn leading to their increased independence and improved self-confidence (Bigge, et al., 2001; Diamond, 2000; Hamill & Everington, 2002; Jones, et al., 1999). A "mobility camp" is one way to help children develop motor skills, increase developmental skills in other areas, review and try new equipment, and an excellent learning opportunity for families, staff and volunteers working with these children.

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Anyone interested in more information about mobility camps can contact HOPE, Inc. at www.HopeIncOnline.org or 866-225-5284.

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