

A From-Disabled-to-Able Approach to the Universal Design of Children's Play Products

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INTRODUCTION

Children spend most of their time playing when they are not asleep or at school (Hofferth and Sandberg, 2001). Play is the main business of childhood (Singer and Singer, 1977). It contributes to the cognitive, motor, and social development of children, including the development of perception, attention, memory, problem-solving skills, language, communication, creativity, logical operations, emotion regulation, self regulation, social skills, gender roles, social relationships, conflict resolution, coping with stress, and so on (Power, 2000). Musselwhite (1986) even described play as a childhood occupation. When dealing with play concepts, a higher level of play themes can more effectively activate intrinsic activity, invite spontaneous and voluntary participation, and create an element of enjoyment, the themes of play according to Brofenbrenner (1979). The use of higher level of play themes in design can also better meet the criteria of play defined by Piaget (1962) to include interest, spontaneity, pleasure, relative lack of organization, freedom from conflicts, and overmotivation.

According to the United States Census Bureau (2002), there are 4.6 million American children under the age of 15 that have disabilities; 2 million of them have severe disabilities. Children with disabilities often have considerably fewer opportunities to play than children without disabilities because of the constraints of abilities and due to the lack of consideration in the design of play products. However, play is so integral to childhood that a child who does not have the opportunities to play is cut off from a major portion of childhood (Musselwhite, 1986). Through such programs as Let's Play, developed by the University at Buffalo, which collaborate with manufacturers to utilize universal design features in toy designs, children with disabilities can be included in universal toy design approaches. This "from-able-to-disabled" universal design approach, illustrated in Figure 1, demonstrates that by expanding the "Ability Range" based on themes of play, target user groups are expanded and more children benefit.

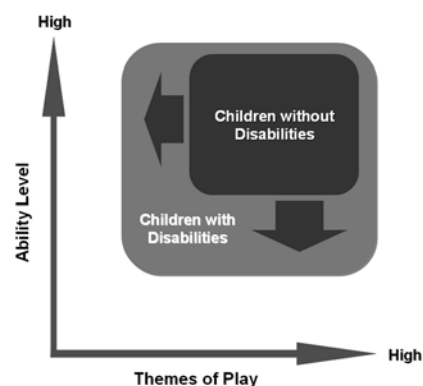


Figure 1. "From-able-to-disabled" universal design approach.

Although the "from-able-to-disabled" approach can effectively broaden the opportunity to play for children with disabilities, a "from-disabled-to-able" approach can conversely broaden the play opportunities for children without disabilities.

A "from-disabled-to-able" approach can help reduce the strictly therapeutic design of toys for children with disabilities by expanding the themes of play to include the needs of children without disabilities in the design of children's therapeutic products. It is literally a practice of universal design from the reverse direction from the aspects of user group. Once the playability of a therapeutic product is enhanced,

children without disability can also enjoy the fun elements of these therapeutic products while also benefiting from skill development through play. Additionally, the larger production volume from a broadened market can significantly lower the product cost and make the products more affordable. Figure 2 illustrates the essence of this approach. To make this method effective, designers need to carefully optimize the play themes and aesthetic value of a product while maintaining its intended treatment effectiveness.

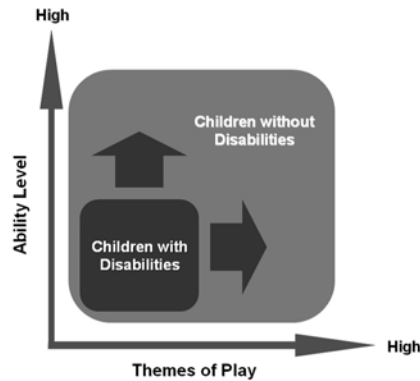


Figure 2. “From-disabled-to-able” universal design approach.

Two student projects, conducted by industrial design students at Auburn University, experimented with the implementation of the “From-disabled-to-able” approach in the design process. Both projects were initiated from pediatric therapeutic needs and were intended to create designs that appeal to children both with and without disabilities. These two projects were the Play Racer and the Talk Light.

PLAY RACER

There are 741,000 children, under 15 years old, in the U.S. who have difficulty in walking or running, based on the statistics of U.S. Census Bureau (2002). Many of these children’s transportation products are restricted to wheelchairs, walkers, crutches, or scooters. In a playground, these children are not capable of riding a bicycle or tricycle to explore the environment and interact with other children. Play Racer was a project aimed to create a play product design that children both with and without lower extremity disability can ride and control, in addition to offering a fun way to enhance a child’s upper extremity strength and improve physical coordination.

Existing Products

Few products on the market are designed to meet the outdoor riding play needs of both disabled and mainstream children. The products in Figure 3 are some examples of current products marketed solely for disabled children, and their retail prices. Institutional appearance, high price, and insignificant entertainment value are the common drawbacks of these products.



Figure 3. Pediatric riding products on the market.

Design Criteria

When designing using the “from-disabled-to-able” approach, the first focus must be on satisfying the physical needs of disabled children. Linder (1994) pointed out the critical criteria for designing therapeutic products for children with motor problems. These criteria are as follows:

- a. A child’s body should be positioned to enable the child to play.
- b. The child needs to be supported to allow good trunk stability with arms and hands free to manipulate toys.
- c. Objects need to be placed within reach and at the optimal visual level.
- d. All the positioning should be done in an unobtrusive way.

Using the necessary criteria as a baseline, the “from-disabled-to-able” universal design approach allows for the creation of new criteria to produce products appealing to mainstream children as well. Additional criteria established for this project based on the concept of the “From-disabled-to-able” approach include elements such as:

- e. “Toyish” appearance
- f. Facilitating low-cost and high-volume production
- g. Expanding the fun element of the riding

Although the added set of criteria placed extra challenges in the design process, they provided the momentum to expand the spectrum of the design to include the needs of the mainstream children’s market. This expanded spectrum resulted in a product that is welcome in all children’s markets.

Design Process

Based on the project goals and criteria, the design student started user research, concept development, and testing. Unlike typical design research focused on a particular user group, the project conducted studies on two distinct segments, children with and without disabilities. There were areas where both groups’ needs were fulfilled and there were circumstances where certain compromises were necessary in order to optimize the overall solution. After the research phase, the whole design emerged from a seat that well positions and supports a child’s body. Two pressing bars were located within the reach of the child to push forward. Children of various abilities were tested to press the pushing bars. Varieties of wheels were also experimented with, in an effort to create a “toyish” image. The design process of Play Racer is illustrated in Figure 4.

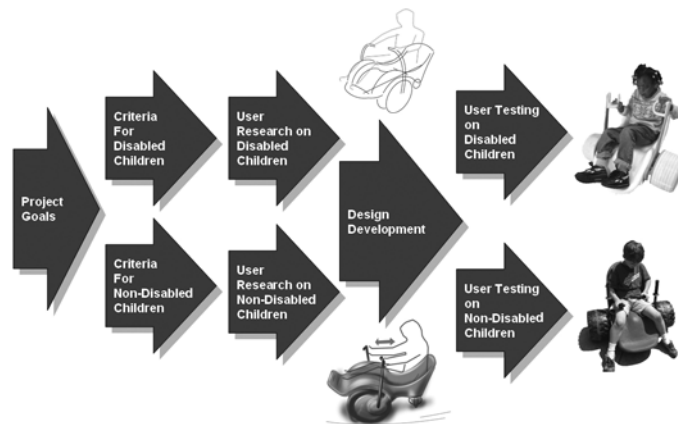


Figure 4. Design process of Play Racer.

Design Solution

A full sized working model was fabricated toward the end of the design process. It was tested in both indoor and outdoor settings. All twenty children in the test, ten with disabilities and ten without disabilities, immediately recognized Play Racer as a toy ride when they saw it for the first time. Both groups of children enjoyed the ride, including some cerebral palsy children without the ability to stand on their own. In addition, the product was designed to be constructed by blow molded plastic parts and off-the-shelf bicycle components for easy and low cost production. Traditional toy distribution channels, in addition to therapeutic product channels, can carry Play Racer and facilitate its affordable access to all children. Figure 5 presents the final design and Play Racer in use by children with and without disabilities.



Figure 5. The final design for Play Racer.

By producing an economic toy design recognized by all children as a riding toy, the essence of the “From-disabled-to-able” design approach was applied. The resulting Play Racer is a therapeutic product identified as a toy first, therapeutic product second. This result is a toy that can be valued in two children’s market segments, and deemed a truly universally designed product.

TALK LIGHT

According to the statistics of U.S. Census Bureau (2002), 769,000 American children have speech difficulties. Speech and voice problems are the two major symptoms of speech difficulties. The use of play as an intervention tool is increasingly viewed as one appropriate medium for communication specialists (Terrell et al., 1984). A voice sensitive device, illustrated in Figure 6, was produced in the 1980s and has been used by many speech therapists to improve a patient’s voice volume. The light on top of the device glows when a user speaks. The higher the speech volume, the brighter the light glows, as an encouragement and indication of the voice loudness. This device was designed as a therapy tool with an institutional appearance, even though it has been used in both clinic and home settings by therapists.



Figure 6. Existing voice therapy device.

Design Criteria

Even though Talk Light was a redesign of an existing product, a new set of criteria was established upon interviews with speech therapists, early childhood educators, and parents in order to explore and meet the new requirements and expectations. These inputs constructed the therapeutic and play themes criteria for children with and without disabilities. These criteria included the following:

- a. Visible lighting increments according to voice volume.
- b. Adjustable sensitivity to voice for the monitoring of progresses.
- c. Constructing a focal point of speaking.
- d. Stable product set-up.
- e. Portable and compact.
- f. Toyish appearance and colors.
- g. Safe for children.
- h. Easy for children to operate.

Criterion f, g, and h were specifically created for the enjoyment elements of the product following the “From-disabled-to-able” concept. From the perspective of early childhood education, the correlation between voice input and lighting output provides an interesting learning experience for all children, and allows the Talk Light to serve as a Sensorimotor Play tool in developing circular reactions (Scarlett et al., 2006).

Design Process

Processes, similar to those implemented in the design of the Play Racer, were adopted in the design process of the Talk Light. An exception to this was the more active participation from speech therapists, children educators, and parents in the design of Talk Light. This active role was especially present in the establishment of design goals and criteria. The higher degree of involvement from the beginning of the design project offered significant contribution to the integration of the needs from children with and without disabilities. Figure 7 demonstrates the ways in which the mentioned parties participated in the development process.

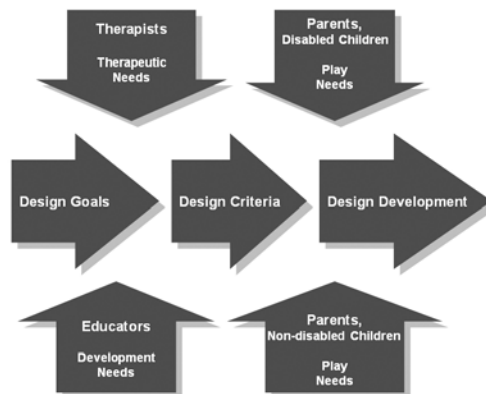


Figure 7. The design process for Talk Light.

Design Solution

The final design of Talk Light is presented in Figure 8. A microphone was created as the focal point of a child because it is a universally recognized speaking icon and it extends a natural invitation to speak. The microphone can be folded to its base for portability and storage. Three different colors of LED lights, two of each color, illustrate the voice volume detected from the speaker. The higher the speech volume, the higher the LED lights will be illuminated. The buttons on the base were designed to be easy for both therapists and children to adjust the sensitivity. Therapists can collect more detailed readings from the LCD screen on the base. Talk Light is also designed to be easily produced at low costs, just like other electronic toys.



Figure 8. The final design for Talk Light.

In field tests, many children spontaneously picked up Talk Light and spoke to the microphone. These nondisabled children enjoyed experimenting and observing the coordination between their voice volume and the lighting effects. Some of these children even pretended to talk as TV announcers or hosts. Most of the parents mentioned that they would be interested in buying Talk Light.

CONCLUSION

A “from-disabled-to-able” approach can contribute to the advancement of universal design principals in children’s play and education products by creating therapeutic products with more play elements to include children without disabilities. The two projects presented in the paper not only provide examples of the design process of implementing the “from-disabled-to-able” universal design concept, but also demonstrate effective results that a designer can create based on this avenue. If therapists, educators, parents, and designers can collaborate closely, many pediatric therapeutic products can be identified and designed to include the play needs of both disabled and nondisabled children. More products can therefore be developed that everyone can afford, enjoy, and learn from, and that allows everyone to play.

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