The Design and Use of Functional Sensory Boards

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Purpose

Undergraduate and graduate occupational therapy students worked with a client in the Ithaca College Occupational Therapy clinic during the fall 2017 semester. Graduate students were also enrolled in an assistive technology class during the semester. The client is an eleven year old boy with diagnoses of autism, chromosome 7 abnormality, and global developmental delays resulting in challenges engaging in everyday activities without 1:1 assistance. We created sensory boards for our client to address his functional needs in both home and school environments. The boards provided a pathway for our therapeutic goals including: facilitating finger extension to help with communication device, grasp patterns, sensory play, and fostering independence with activities of daily living.

Methods

When designing and creating the sensory boards, we considered the importance of finding a balance between providing our client with a toy that was appropriate for both his developmental level and would address the functional skills he needs in life as a fifth-grade student. According to Mary Reilly's Occupational Behavior frame of reference, it is through engagement in play that people develop foundational skills needed for future activities of daily life (Mack, Lindquist, & Parham, 1982). Connecting with Reilly's theory, Piaget's Cognitive Stages of Development suggests that during childhood, play skills develop in stages beginning with sensorimotor play (Fischer, 1980). Through observation, we concluded that our client primarily engaged in solitary sensory play, which is typically seen in toddlerhood. We used our observations and our client's occupational interests (e.g. dogs) to create multisensory boards to

facilitate skills within his "zone of proximal development" (Vygotsky, 1987). We drew from the Human, Activity, Assistive Technology (HAAT) model to decide what type of assistive technology would benefit our client's current abilities, daily activity demands, and contexts (Giesbrecht, 2013). The components we chose are aimed at foster independence with daily tasks such as opening and closing items, dressing, using certain grasps for various activities, and more.

Process

Decision Making

We custom-designed six interchangeable dog-themed, wall-mountable sensory boards for our client's bedroom. The elements on the sensory board are easy to see because of the contrasting black background of the board; a decision made to minimize the effects of our client's visual impairment. For finger extension we used a light switch, a Staples Easy Button, and a dog food tunnel. We chose to include elements with a cause-and-effect relationship in order to add a motivational component to the play elements (e.g. sound or light reaction).

Three-dimensional printed materials have been shown to be beneficial to rehabilitation-related assistive technology in clinical practice (Mikołajewska et al., 2014). According to Mikolajewska et al. (2014), three-dimensional printed materials offer customizability and lowers the cost of design and manufacturing. We incorporated three-dimensional printed components allowing us to create an individualized multi-sensory experience (e.g. magnetic fence puzzle pieces).

Building

We collaborated with computer science students and the theater department for creating the board's elements. Computer science students helped us create three-dimensional prints and the theater department provided various materials. Modifications were made after a home visit to

improve the board based on observations and his family's suggestions. For example, the small bells we included for practicing fine motor control were modified to be glued together to avoid a choking hazard. Another modification made was having the boards wall-mounted rather than freestanding because of the boards' and their elements' durability. Rather than using a blueprint to create the boards; we used research evidence, clinical observations, trial and error, and our creativity to create personalized sensory boards for our client.

Conclusions

Our prototype project involved a multidisciplinary approach to creating customized assistive technology. Our innovative and collaborative efforts increased opportunity for engagement in functional play. In the future, we would make the boards more durable and consider creating a sturdier easel to prop the boards up. We plan to continuously monitor the process. The mother reports that he and his siblings enjoy using the sensory boards. It is important for OT's to consider ways to increase access to assistive technology and promote research about multidisciplinary approaches to custom designing assistive technology.

References

Fischer, K. W. (1980). A theory of cognitive development: The control and construction of hierarchies of skills. *Psychological Review, 87*(6), 477-531. doi:10.1037/0033-295X.87.6.477

Giesbrecht, E. (2013). Application of the Human Activity Assistive Technology model for occupational therapy research. *Australian occupational therapy journal*, *60*(4), 230-240. Doi: 10.1111/1440-1630.12054

Mack, W., Lindquist, J. E., & Parham, L. D. (1982). A synthesis of occupational behavior and sensory integration concepts in theory and practice, Part 1. Theoretical foundations. *American Journal of Occupational Therapy*, *36*(6), 365-374.

Mikołajewska, E., Macko, M., Ziarnecki, Ł., Stańczak, S., Kawalec, P., & Mikołajewski, D. (2014). 3D printing technologies in rehabilitation engineering.

Roberts, T., Stagnitti, K., Brown, T., & Bhopti, A. (2018). Relationship between sensory processing and pretend play in typically developing children. *The American Journal of Occupational Therapy*, *72*(1), 1-8. http://dx.doi.org.ezproxy.ithaca.edu:2048/10.5014/ajot.2018.027623

Tous-Ral, J., Muiños, R., Liutsko, L., & Forero, C. (2012). Effects of Sensory Information, Movement Direction, and Hand Use on Fine Motor Precision. *Perceptual and Motor Skills*, *115*(1), 261-272.

Vygotsky, L. (1987). Zone of proximal development. *Mind in society: The development of higher psychological processes*, *5291*, 157.