Increasing the Use of Technology in Pediatric Inpatient Rehabilitation

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Author Note

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Abstract

Assistive technology (AT) can facilitate increased participation and independence for individuals, and occupational therapists (OTs) are well suited to utilize it with their patients. The use of technology, specifically video games, is motivating to children, and is supported by the literature. Thus, the pediatric inpatient rehabilitation team at a local hospital identified that they would like to use technology more frequently to increase evidence-based practice and motivation. However, barriers included lack of awareness of appropriate technology and modifications for patients with a wide range of abilities and limited time for set up and to learn how to use technology. The purpose of this doctoral capstone project was to increase the use of technology on this unit. To do this, the doctoral capstone student focused on targeting individual outcomes by using technology in OT intervention and translating technology programming to practice through barrier reduction by providing educational materials and in-services. The technology programming was supported by positive responses from the program evaluation survey, including increased knowledge of technology, intent to use it, and acknowledgement of the benefits of its use. Time continues to be a barrier, including time to set up systems and increase comfortability with/confidence in using the technology available. With this, the doctoral capstone student recommends that the site continues to practice quality improvement by providing additional in-services and opportunities for hands-on learning to support sustainability of technology programming.

Keywords: assistive technology, adaptive gaming, pediatric inpatient rehabilitation

Increasing the Use of Technology in Pediatric Inpatient Rehabilitation

Occupational therapy (OT) practitioners utilize a holistic perspective to analyze their clients' activity demands, habits, routines, skills, and performance patterns (Aftel et al., 2011). Assistive technology (AT) is defined as "any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities" (Assistive Technology Act, 2004). Clients can experience occupational injustice due to disability (Batarowicz et al., 2006; Whiteford 2004, 2011). However, the use of AT to increase participation in meaningful activities, including self-care, play, and communication can result in improved quality of life and psychosocial experiences for clients (Botelho, 2021; Jamwal et al., 2017; Joseph, 2003; May-Teerink, 1999). When the way an individual used to participate in an occupation is no longer possible, OTs can intervene to provide modifications through the education and provision of appropriate AT to maximize independence and participation (Aftel et al., 2011).

The doctoral capstone student completed her capstone project within an inpatient rehabilitation unit at a local pediatric hospital. In this setting, a multidisciplinary team provides comprehensive care that addresses recovery, quality of life, and functional abilities for patients who have experienced injuries and illnesses, such as spinal cord injuries, strokes, burns, and cancer, that have severely affected their ability to engage in their daily activities (Coley, n.d.). Patients receive intensive therapy daily from OT, physical therapy (PT), and speech therapy (ST), in addition to medical care, therapeutic recreation (TR), schooling, and more.

The pediatric rehabilitation unit at this hospital has access to various technologies including video game systems, an arm robot, and a 3D printer. In addition to the technology available at the capstone site, a local nonprofit organization has a loan library; this is an asset to the patients and staff members at this hospital, increasing access to assistive technology. While there is evidence to support the use of technology in OT practice, the OTs at the site identified that they do not use it frequently and would like to use it more. They identified barriers including lack of knowledge and limited time for set up and to learn how to use technology. Thus, the primary focus of this capstone project was to develop programming to overcome the barriers to use of these systems. An OT student was well suited to serve this site due to strengths including creative problem-solving skills, a holistic perspective of patients, and the knowledge of environmental and task modifications and body structures and functions. Assistive technology and video gaming use are essential in this setting to improve the patients' qualities of life and engagement in meaningful occupations, including play, leisure, and social participation, and should be prioritized.

Needs Assessment

The needs assessment process began during the first capstone course with an idea to promote age-appropriate play through switch adaptations; the idea eventually developed into using technology in general to improve patient health and quality of life. To determine the purpose of this capstone project, this process required the conduction of an initial literature review, an interview with the occupational therapists (OTs) at the capstone site, and a gap analysis during the second and third capstone courses prior to the 14-week experience. The doctoral capstone student conducted additional site interviews during the capstone experience and conducted further research based on patients she encountered. The following themes related to the project purpose emerged: 1) individual outcomes and 2) translation to practice through barrier reduction (i.e., provision of educational materials and in-services).

Site Interview

To gather information regarding the site's needs and available resources, the capstone student prepared a list of questions for the OTs. The questions included inquiries about the normal routine, how best to prepare, what technology was available, how technology was being used and how often, who would benefit, if technology was meaningful and motivating, strengths and weaknesses regarding implementation, opportunities to incorporate technology, threats to success, and how to support the project through literature. Through the completion of an initial site meeting and this site interview, the capstone student was able to identify key stakeholders and gain a better understanding of each member's role. The stakeholders included the patients and their families and members of the pediatric rehabilitation team.

Results

In the site interview with the site's OTs, the doctoral capstone student learned that a typical day in pediatric rehabilitation followed a strict schedule with patient care and team meetings. At the time, the Wii, Xbox Kinect, Xbox adaptive controller, and GestureTek Immersive Rehabilitation Exercise System (IREX) system were available for use in rehabilitation, and the site mentor reported that they would soon have access to the ArmeoSpring upper extremity arm robot and the Oculus Quest 2 virtual reality system. The therapists reported additional barriers such as lack of awareness of how to use or educate patients on the use of the technology, and that the frequency of existing technology use was patient and caseload dependent. However, the therapists indicated that they would like to use it more frequently and incorporate its use with clients of a wide range of abilities.

Other barriers identified by the therapists were limited time and inconsistent assistance to set up and take down equipment and lack of awareness of other beneficial technologies. On the other hand, patient interest was identified as a strength. Finally, the therapists shared that it would be beneficial to research the technologies they have available at the site and look at the impairments being addressed and how the interventions for those impairments could be generalized to patients with various conditions.

Overview of the Problem

Technology advancements over the years have changed the ways people engage in their daily activities. While the pediatric rehabilitation team at the site had access to various technologies, including the Oculus Quest 2, Nintendo Wii, Xbox Kinect and Xbox adaptive controller, GestureTek Immersive Rehabilitation Exercise (IREX) System and Cube, Infinity Game Table, 3D printer, and Armeo®Spring upper extremity robot, they did not have time to learn how to use them, set them up, or research their use in evidence-based practice. However, this technology can provide patients at this site with an opportunity for play, leisure, and social participation with peers, and the literature supports its use in practice to improve patient outcomes. Therefore, the facilitation of assistive technology and video gaming should be prioritized to improve quality of life and promote engagement in meaningful occupations.

Literature Review

The doctoral capstone student completed a search of the literature on PubMed, CINAHL Complete, and Google Scholar to find articles to support project planning and implementation. In these databases, the student utilized the following terms in the search: occupational therapy, pediatric, assistive technology, adaptive technology, adapted technology, virtual reality, video games, and barriers. The student filtered each search to include articles published between 2011-2022. Within the search results, the student screened articles for relevancy and selected those related to the use of technology, specifically related to video gaming or assistive technology, in rehabilitation. Additionally, the student hand-selected relevant articles from the references of the original articles.

Support for Technology Use in Rehabilitation

Technology is incorporated in many daily activities and OTs are experts in incorporating technology into practice (Grajo & Boisselle, 2018). OTs are skilled in identifying their patients strengths and weaknesses, analyzing barriers, and using creative problem-solving to provide adaptations and modifications (Wagenfeld, 2019). OTs recommend the use of technology to their patients to enable occupational performance and improve quality of life (Grajo & Boisselle, 2018; Wagenfeld, 2019).

Evidence for Specific Systems

In a study utilizing the Wii with patients following a total knee replacement by Fung et al. (2012), researchers found that many OTs and PTs felt that the use of this system benefited their clients and could promote adherence to intervention. Do et al. (2016) also completed a study utilizing the Wii in treatment of children with hemiplegic cerebral palsy. The children in this study experienced improvements in upper limb motor skills and bilateral coordination ability (Do et al., 2016). Further, there is emerging evidence for use of the Xbox Kinect in rehabilitation to improve client outcomes including upper limb strength and dexterity, range of motion, forearm supination, occupational performance, and occupational satisfaction (Arman et al., 2019; Kamel et al., 2021)

Hoffman et al. (2014) conducted a feasibility study using the Oculus Rift virtual reality goggles on a child with severe burns during skin stretching exercises. The child who in this case study reported decreased pain intensity and unpleasantness, while having more fun during virtual reality (Hoffman et al., 2014). Instead of relying solely on pain medications, virtual reality can be used to assist in patient pain control (Hoffman et al., 2014). The Oculus Rift allows its users to immerse themselves in a virtual world in a way that other game systems do not. This feature is especially useful in that it distracts the user from pain (Hoffman et al., 2014). Virtual reality systems used to cost $90,000 but over the years, new technology has become more affordable (Hoffman et al., 2014). The newest Oculus system, the Oculus Quest 2, retails for $299. Due its affordability and potential for use in treatment, the Oculus system warrants further studying.

Children who have decreased strength but can still initiate and engage in upper extremity movements in gravity-reduced environments, may benefit from the use of the pediatric ArmeoSpring System (Meyer-Heim & van Hedel, 2013). The springs in this system are adjustable and assist in supporting the upper extremity (Meyer-Heim & van Hedel, 2013). Meyer-Heim & van Hedel (2013) also reported the length and circumference of the system can be adjusted to fit each child. This system can be used with other systems to facilitate engagement in games (Meyer, Heim & van Hedel, 2013).

Technology Use as a Preferred Occupation

Play is one of the nine occupations that OTs address. It is also one of the main occupations that children engage in. Children in inpatient rehabilitation may find themselves unable to engage in their preferred play activities, including video gaming, due to impairment in their body structures and functions. Incorporating video gaming into practice can facilitate participation in a fun and motivating way (Annema et al., 2010; Bonadiu Pelosi et al., 2019; Reid, 2002). In a study by Bonadiu Pelosi et al. (2019), the researchers found that children had fun playing games on the Wii even if they did not perform well.

Virtual reality may facilitate more intensive treatment as it provides a playful therapeutic environment that motivates children (Meyer-Heim & van Hedel, 2013). To determine why virtual reality promoted volition during play, Harris & Reid (2005) conducted a study with children with cerebral palsy, finding that children were especially interested in the games that provided an appropriate challenge. Miller & Reid (2003) found that children enjoyed play interventions using virtual reality and they reported improvements in self-efficacy, self-confidence, and acceptance by peers and family. Do et al. (2016) suggested that children preferred the addition of a virtual reality system because it made bilateral arm training, which involves simple, repetitive movements, more interesting and fun.

Due to the fun and motivating factors of video games, they also have a role in pain control. Arman et al. (2019) hypothesized that gaming reduced pain and facilitated engagement because it was fun; "the children focused on the fun of games rather than their perception of being treated, because video-based games are interactive, providing visual and verbal feedback, are stimulating, and increase motivation and incentive of achievement" (p. 180). Kamel et al. (2021) agreed that pain and fear decreased during game play because the children were enjoying themselves and the game.

Barriers to Implementation of Technology in Practice

Although there is literature to support the use of technology in practice, there is also evidence for barriers to its implementation. Glegg et al. (2013) found that time and knowledge barriers negatively affected occupational and physical therapists' use of the IREX in brain injury rehabilitation. Even though the therapists felt the IREX was useful and applicable to treatment, they had difficulty incorporating it into their practice (Glegg et al., 2013). "Lack of time and knowledge appear to be the main barriers to implementing VR video games in practice" (Levac et al., 2015, p. 427). Other barriers include lack of training, limited space, technology issues, funding, and lack of appropriate patients (Banerjee-Guénette et al., 2020; Glegg et al., 2013;

Levac & Miller 2013; Levac et al., 2012, 2017). This supports the occupational therapists' answers of this capstone project's needs assessment interview. Levac et al. (2015) indicated that clinicians are busy, so they need support in order to implement video games into practice that facilitate goal achievement.

Levac & Miller (2013) reported that physical therapists that worked with pediatric patients with brain injuries wanted to learn how to use the Wii. Levac et al. (2015) developed and evaluated a knowledge translation (KT) resource to help clinicians select and use Kinect games in physical therapy practice. KT initiatives successfully supported the use of the IREX in the study by Glegg et al. (2013). Banerjee-Guénette et al. (2020) reported that clinicians preferred experiential learning opportunities, hands-on training, individualized learning, and peer-led coaching. It is important to set aside time to train and facilitate practice with new systems and meet therapists' needs because they are the ones who plan and deliver client interventions (Glegg & Levac, 2018).

Liu et al. (2015) conducted a study regarding the acceptance of new technologies for rehabilitation in a large rehabilitation hospital. In this study, the researchers found that therapists were more likely to accept and use technology if they felt the technology could help them or their patients. The acceptance and use of technology was also related to conditions, like support, time, and the environment. The barriers that the therapists in this study identified align with the barriers reported by this capstone student's site mentor as well. Of note, the researchers found that if a therapist intended to use technology, they did indeed use it (Liu et al., 2015).

Gap Analysis

After reviewing the literature, questions still remained unanswered about best practices that could be implemented to sustain increased use of technology in practice at this site considering barriers uncovered in the needs assessment and the literature. With this, this capstone project's purpose was to improve the use of technology in a pediatric rehabilitation setting by overcoming the site-specific barriers through educational seminars and resources.

The research from the literature review and site needs informed the doctoral capstone student's decisions in project design and implementation. The student identified appropriate patients for participation and collaborated with the pediatric rehabilitation team on how the available technology could be used to address patient goals. After determining how to support the staff members in using technology more frequently, the goal was to deliver the resources and educate appropriate personnel to support sustainability of this program.

Guiding Model

The Occupational Adaptation model supported this capstone project because it is a holistic model that considers the patients' environments and bodily functions, while validating personal limitations and potential. This model assumes that people function when they can adapt to challenges (Schultz, 2014). This model "emphasizes the creation of a therapeutic climate, the use of occupational activity, and the importance of relative mastery" (Schkade & Schultz, 1992). A person's capacity to adapt is challenged by a stressful event, disability, or impairment (Schultz, 2014). Schultz (2014) implied that high levels of dysfunction create more demand for change. Cole (2018) stated that this model includes three motivational sources including demand for mastery (environment), desire for mastery (person), and press for mastery (person-environment interaction). The person responds to an occupational challenge with adaptation. When a person is able to adapt with sufficient mastery to satisfy themselves and others, they have experienced success in occupational performance (Schultz, 2014).

Children in inpatient rehabilitation may not be able to engage in typical play but adaptations with assistive technology can facilitate participation in meaningful activities. Throughout this experience, the patients at this site chose activities that were meaningful to them and that they wanted to master. The doctoral capstone student facilitated engagement in these activities using various technologies to support achievement of relative mastery. In addition to implementing interventions herself, the doctoral capstone student planned to develop technology programming for the pediatric rehabilitation team. These team members demonstrated the desire to learn more about technology to support their patients. With this, the capstone student created educational materials and learning opportunities to emphasize the utility of technology to enable increased participation and independence. Through the integration of technology programming, the capstone student observed improvements in patient outcomes and gathered positive feedback from clinicians regarding increased knowledge of technology.

Project Plan and Process

The doctoral capstone student's plan was to learn how to use the available technology, teach the staff members, and create materials to support sustained use. The student reviewed the project plan with the site mentor prior to the capstone experience and agreed to split time evenly between clinical skills and program development. By completing patient care, the student would be able to learn about the site's culture and implement interventions using the technology herself to determine feasibility of the program. Throughout the process, the student updated goals and objectives, as seen in Table 1, to reflect the needs of the site.

Weeks One through Four

The first several weeks were used to inform the doctoral capstone student's development of resources. The capstone student met with additional stakeholders, including the rehabilitation unit's schoolteacher and TR team, to make updates to the needs assessment and create inclusive resources that would help all members of the team achieve their patient's goals through the use of technology. The capstone student considered the usefulness of applications and internet browser extensions to increase accessibility for school participation and how assistive technology could be useful in community reintegration and leisure participation. Additionally, the capstone student engaged in observation and direct patient care, immersing herself in the culture of the site. In the first few weeks, the student developed a therapeutic relationship with a patient on the unit who would benefit from education on phone accessibility. This influenced the student to research the topic and find solutions for the patient.

Weeks Five through Twelve

In the initial half of this experience, the capstone student found herself dedicating the majority of her time to clinical skills versus program development. However, it was through this effort that the student gained a better understanding of the site to create a client-centered product. As time progressed, the student determined that she was having difficulty balancing clinical skills and project work time. The student learned about the site's technology and continued to find supporting articles for the literature review during down time, but these moments were few and far between as most of the time was spent treating, participating in conferences, or documenting. Biweekly meetings were held with the student's site mentor to monitor progress and gather feedback. During one of the meetings with the site mentor, the capstone student requested one day a week to dedicate to program development. With this time, the capstone student was able to develop and provide an in-service for switch adaptation (see Appendix A) in response to a request from the site's occupational therapists and also, create a binder outlining technologies available at this site (see Appendix B).

Final Weeks

Following the development of the educational resources, the capstone student shared the technology resource guide with the pediatric rehabilitation team. Additionally, the capstone student offered support in the implementation of technology in the final weeks. Finally, to evaluate effectiveness of the in-services, educational materials, and the overall capstone experience, the capstone student developed and delivered a survey and analyzed the results to share with the site.

Implementation

The capstone project was implemented throughout the 14-week experience to serve the patients at the site at the time the student was present. The student adapted her plans based on the needs of her patients. The pediatric rehabilitation team, patients, and caregivers participated in the capstone student's programming as she offered educational materials and in-services and implemented interventions utilizing technology.

In response to the patient that could benefit from education on phone accessibility, the doctoral capstone student contacted a local nonprofit organization's technology loan specialist. The student hosted the loan specialist for an in-service to educate the pediatric rehabilitation team on how to use switches to control one's phone. The capstone student was then able to borrow the equipment to trial with the patient. This in-service was instrumental in informing the therapists at the site that the local loan library exists and can be a great resource for patients and their families. The capstone student created an informational handout for families in response to a request from the TR team.

During Week 11, the capstone student provided the in-service and educational materials on how to switch adapt toys. The student also compiled a list of resources the site would need to complete the process. This list was shared with the OT supervisor who planned to purchase these materials so that therapists would be able to adapt toys for their patients.

Throughout the experience, the student educated various staff members on how to set up and use technologies, including the Oculus Quest 2 and GestureTek Cube. This included informal and brief education as it fit within the therapists' schedules. While the student was not able to provide an in-depth demonstration on the Xbox adaptive controller, she initiated conversations with individuals who have experience with adaptive gaming to set up an in-service in the future. In addition to these demonstrations, the capstone student emailed the staff the guide to technology use that she created, providing a brief overview of the contents and alerting them to a new folder added to a shared cloud-based drive with the guide and relevant resources (e.g., supporting articles, PowerPoints, handouts, etc.). The capstone student also created a physical copy of the resource and delivered it to the site mentor.

Along with program development, the doctoral capstone student also regularly managed care for one to two patients at a time. The student completed evaluations, planned and implemented interventions for four treatment sessions daily, administered weekly reassessments for progress notes, participated in weekly conferences, completed home evaluations, and determined discharge plans. The student gained experience working with patients with complex medical, psychological, and social needs, including transverse myelitis, encephalitis, complex regional pain syndrome, spinal cord injury, hemiplegia, and more. The student incorporated technology in interventions with her patients to facilitate increased participation.

One deviation from the original plan was that the GestureTek IREX system was nonfunctional. The site's manager reported that this has been an ongoing issue and suggested that the device was no longer supported by the company. Thus, it was an obsolete piece of technology. Therefore, the capstone student chose to exclude this from her technology programming. Additionally, the capstone student was unable to truly teach staff about adaptive gaming using the Xbox adaptive controller due to time constraints but initiated steps to set up future in-services. Barriers during the implementation process included time. Supports during the implementation process included flexibility of the site mentor, collaboration with a capstone student with expertise in virtual reality, and buy-in from patients and therapists. As this project was meant to implement a program and evaluate it within the site, IUPUI's institutional review board (IRB) determined that this project did not meet research criteria. It is not suggested to replicate this project or generalize its results (Deluliis & Bednarski, 2020).

Evaluation

The site mentor assessed the capstone student's progress with clinical skills. The mentor noted the student's ability to initiate meetings with staff members, exhibit professional behaviors, and plan and implement appropriate and meaningful interventions. The site mentor commented that the capstone student "demonstrates a skill level that is more than appropriate for an entry-level occupational therapist."

Program evaluation is imperative to support sustainability of the capstone project (Deluliis & Bednarski, 2020). To evaluate the effectiveness of the technology programming, the doctoral capstone student collected data via survey.

Methods

The doctoral capstone student and site mentor determined that a survey would be the best method to determine the impact of the capstone project, as surveys provide descriptive information that help measure satisfaction or identify needs (Deluliis & Bednarski, 2020). Inpatient rehabilitation staff members are expected to follow a strict schedule to meet their patients' therapy minutes. With this, surveys allowed participants to provide feedback on their own time. The capstone student developed survey questions that utilized a Likert scale with 5 points, allowing respondents to express how strongly they agree or disagree with each statement (McLeod, 2008). The capstone student also added open-ended questions to gather qualitative data. The capstone student added questions to Qualtrics and delivered the survey (see Appendix C) to the pediatric rehabilitation team, including OT, PT, ST, TR, techs, and the schoolteacher, via email. The email included a document that informed participants of the purpose of the survey, why they had been recruited, and the risks and benefits. Participants were informed that they could decline to answer questions, would not be compensated for completing the survey, and their information would be protected. The capstone student adjusted the settings in Qualtrics to anonymize responses (i.e., IP addresses, location data, and contact data were not recorded). After collecting responses, the capstone student averaged data for quantitative responses and identified themes within qualitative responses.

Results

Six staff members completed the survey. To determine what specific technology staff members gained competency in, the capstone student asked respondents to check the boxes of the technology covered in the final project. Respondents reported that they gained knowledge on games to play on the Wii and Kinect, the Armeo®Spring, the Infinity Game Table, the GestureTek Cube, the 3D printer, adaptive switches, switch-adapted toys, and apps or internet browser extensions for accessibility; at least one person checked off each box. In response to borrowing technology from the local loan library to trial, 33.3% strongly agreed while the remaining respondents somewhat disagreed, remained neutral, or somewhat agreed. In response to recommending the local loan library to patients and families, 83.3% strongly agreed and

16.67% somewhat agreed. Regarding confidence in switch adapting toys, 16.67% of respondents strongly agreed, 66.67% somewhat agreed, and 16.67% remained. In response to increased confidence in choosing technology to use with patients, 66.67% of respondents somewhat agreed and 33.3% strongly agreed. The results were split equally between somewhat agreed and strongly agreed regarding increased confidence in implementing technology with patients. Regarding intent to use technology with patients more frequently, 66.67% of respondents somewhat agreed and 33.3% strongly agreed that they intended to use technology. See Table 2 for a breakdown of the responses.

Answers to the survey's open-ended questions allowed the doctoral capstone student to gather additional feedback. Respondents identified that knowledge of initial setup and how to operate various technology devices as barriers that were reduced because of the capstone experience. On the other hand, they identified comfortability with the unit and time to learn and practice as the barriers that still exist. When asked about the impact of technology on patients, respondents reported a positive impact and increased enthusiasm. Finally, respondents acknowledged the use of technology as beneficial, sharing that it is motivating, fun, engaging, and immersive.

Discussion

The doctoral capstone student expected to find themes among staff members' survey responses regarding 1) perceived usefulness of the resources and in-services provided throughout the student's experience and 2) intent to use technology in the future. Overall, the responses to the capstone project were positive as respondents indicated an increase in knowledge about the available technology and recognized that technology is motivating to children. While time to set up and learn about technology continues to be a barrier, it appears that the resources and in-services provided have helped increase the knowledge of what is possible and available in terms of assistive technology. This project and experience emphasized the variety of technology devices available to the pediatric rehabilitation unit and the utility of technology in improving patient outcomes and facilitating accessibility. The doctoral capstone student provided the guide to technology use and shared associated resources within the site's shared cloud-based drive to facilitate continued use of technology after the capstone experience ended.

Throughout the capstone experience, the needs of the stakeholders changed. The doctoral capstone student educated patients and staff members on technologies based on each patient's meaningful occupations and goals. In response to the evolving needs of the site, the capstone student adjusted goals throughout the process. With these adjustments, the capstone student was able to achieve her project's goals and objectives in gaining clinical skills and developing, implementing, and evaluating technology programming.

Limitations and Future Directions

The limited number of responses to the program evaluation survey is a limitation of this project. As the resources provided and the survey administered were created specifically for this site, the results are not generalizable to other units at this site or other pediatric inpatient rehabilitation units. The survey results were shared with the site mentor; with these results, the site's stakeholders can be aware of the barriers that still exist and can determine the next course of action to improve programming in the future. It may be beneficial for a second capstone student to continue the work of this writer. This doctoral capstone student would recommend that the next student be knowledgeable about adaptive video gaming, such as using the Xbox adaptive controller, and provide more opportunities for hands-on learning.

Impact

When there is a lack of awareness of AT that can help a child with a disability overcome a challenge, the child is at a disadvantage. However, an occupational therapy perspective can guide the process to selecting the appropriate AT and educating the child's team on how to use it. By educating staff members on how to adapt toys, they will be able to provide these toys to their patients and increase accessibility for children who may not be able to use off-the-shelf toys. Adapted toys afford children with disabilities increased opportunities for play. By hosting an in-service and creating a handout about the local organization's loan library, staff members can continue to learn about assistive technology and share that information with families. By providing resources on a shared cloud-based drive, via email, and in a binder, the capstone student hoped that staff members would be able to access materials easily and in turn, utilize the technology more frequently. By targeting stakeholders' knowledge through this experience, it was the capstone student's goal to eventually improve patient outcomes and overall quality of life through increased technology use.

While implementing interventions using technology, the doctoral capstone student observed that patients enjoyed treatment as playing games was fun. Using the ArmeoSpring, one patient completed AROM exercises, but the associated games provided them with an appropriate challenge that was motivating. Other patients were able to increase standing tolerance and balance for activities of daily living as they played with the Infinity Game Table, the Wii, and the Oculus Quest 2. Overall, the doctoral capstone student was able to advocate for the use of technology. In the evaluation of the capstone student, the site mentor reported that the student was able to highlight the "value of technology use within the field of OT to promote increased patient participation and improved performance."

Sustainability

The sustainability of the doctoral capstone's student technology programming is supported by the provision of educational materials and buy-in from key stakeholders. The pediatric rehabilitation team indicated increased intent to use technology with patients, and as long as patients value technology, it is important to include its use in treatment in order to provide patient-centered care. Also, the sustainability of providing switch-adapted toys to patients is supported by the therapists' access to donated toys in the hospital's volunteer auxiliary.

Conclusion

The purpose of the capstone project was for the doctoral capstone student to increase the use of technology on the pediatric rehabilitation unit at this local hospital. AT can facilitate increased patient independence and participation in meaningful activities, and thus, the use of technology should be prioritized. The site's stakeholders initially identified that video games are motivating to children but expressed that they lacked knowledge about the site-owned technology and had limited time to set up and learn how to use it. To accomplish the purpose, the capstone student sought to learn how to use the available technology, teach the staff members, and create materials to support sustained use. After educating herself on the various technologies available, the capstone student implemented technology in her interventions as a supplement to traditional therapy and provided in-services and educational materials to raise awareness of the utility of technology within pediatric inpatient rehabilitation. Program effectiveness was assessed via a survey to support its sustainability following the conclusion of the capstone project.

Survey results supported effectiveness of the capstone experience and project with overall positive responses, including increased awareness and knowledge of technology, intent to use it, and acknowledgement of the benefits of its use. The doctoral capstone student recommends further quality improvement of the technology programming to support sustainability, including additional in-services and opportunities for hands-on learning. The educational materials provided during this capstone project support the future use of technology on this unit. This capstone project emphasized the benefits of technology use in pediatric rehabilitation in promoting patient participation and subsequently, improving quality of life.

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Table 1

Improving Technology Use in Pediatric Rehabilitation Project Goals and Objectives

Project Goal	Associated Objectives
1. The student will develop technology programming within pediatric rehabilitation.	a. Adjust needs assessment as needed with key stakeholders by end of week 2. b. Learn how to use the technology available to the site. c. Discuss with therapists how available technology can be used to address patient goals. d. Design interventions that utilize available technology and review with site mentor.
2. The student will implement technology programming within pediatric rehabilitation.	a. Educate pediatric rehabilitation therapists on how to use applicable technology. b. Incorporate interventions that utilize available technology that align with patient interests/goals. c. Educate appropriate personnel to support sustainability of program. d. Develop plan for creation of programming materials (written guides).
3. The student will demonstrate efficacy of technology programming through program evaluation	a. Conduct post-program survey with the site's pediatric rehabilitation team members who participated in interventions/educational sessions regarding technology. b. Analyze survey results to determine the impact of technology programming within pediatric rehabilitation.
4. The student will gain advanced clinical skills in pediatric inpatient rehabilitation.	a. Observe occupational therapists with expertise in pediatric inpatient rehabilitation throughout the 14-week experience. b. Explore and expand occupational therapy's role in the use of technology in pediatric rehabilitation. c. Implement interventions that utilize available technology within pediatric rehabilitation. d. Plan, treat, and document for 1-2 patients independently.

Table 2

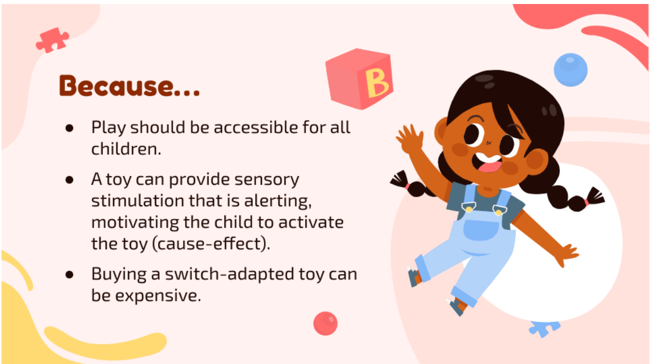
Survey Responses to Likert Scale Questions

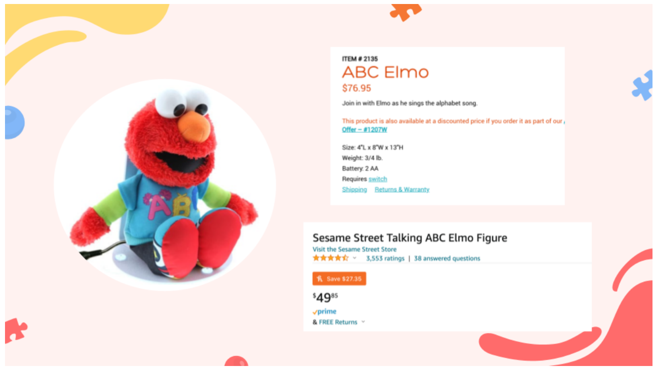
Question	Minimum	Maximum	Mean	Standard Deviation	Variance	Count
1. I will borrow technology from the local organization's loan library to trial in the future as a result of this experience.	2.00	5.00	3.67	1.11	1.22	6
2. I will recommend the local organization's loan library to my patients and their families as a result of this experience.	4.00	5.00	4.83	0.37	0.14	6
3. I feel confident that I can switch adapt a toy using the resources provided.	3.00	5.00	4.00	0.58	0.33	6
4. I feel more confident in choosing technology to use with patients after the in-services and resources provided.	4.00	5.00	4.33	0.47	0.22	6
5. I feel more confident in implementing technology with patients after the in-services and resources provided.	4.00	5.00	4.50	0.50	0.25	6
6. I intend to use technology with patients more frequently following this experience.	4.00	5.00	4.33	0.47	0.22	6

Note. Responses were recorded on a Likert scale (1 = *strongly disagree* to 5 = *strongly agree*).

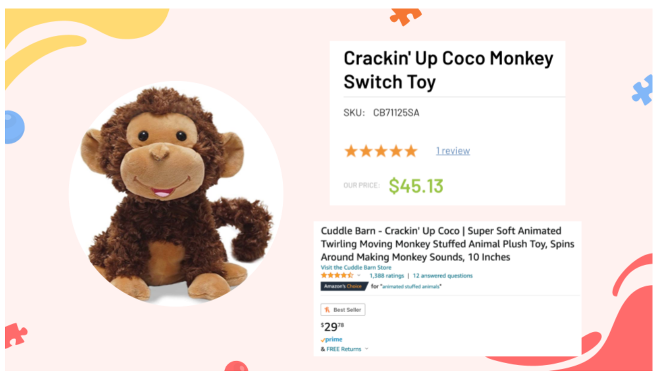
Appendix A

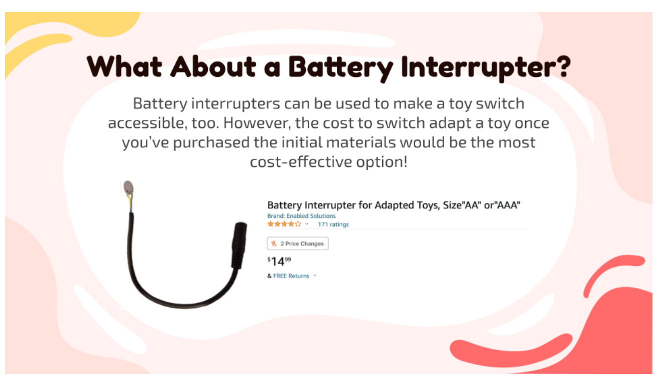
Switch Adaptation PowerPoint Presentation

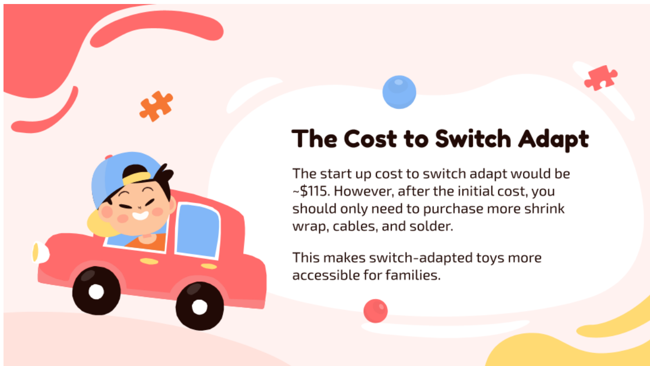


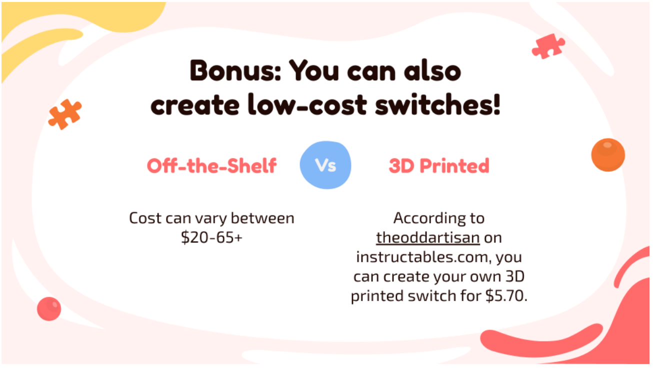

ITEM # 2135
ABC Elmo
$76.95
Join in with Elmo as he sings the alphabet song.
This product is also available at a discounted price if you order it as part of our
Offer – #1207W
Size: 4"L x 8"W x 13"H
Weight: 3/4 lb.
Battery: 2 AA
Requires switch
Shipping Returns & Warranty
Sesame Street Talking ABC Elmo Figure
Visit the Sesame Street Store
3,553 ratings | 38 answered questions
Save $27.35
$49.85
prime
& FREE Returns

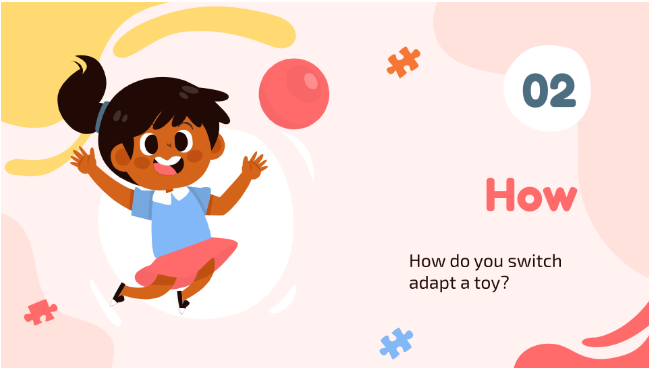

Gazillion Hurricane Bubble Blower Switch Adapted Toy
SKU: Gazillion
4 reviews
OUR PRICE: $62.12
Gazillion Bubbles Hurricane Machine, Colors May Vary , Green
Visit the Gazillion Store
5,634 ratings
Compare at 2 Stores
-26% $11.10 ($0.23 / oz)
List Price: $14.99
prime
& FREE Returns

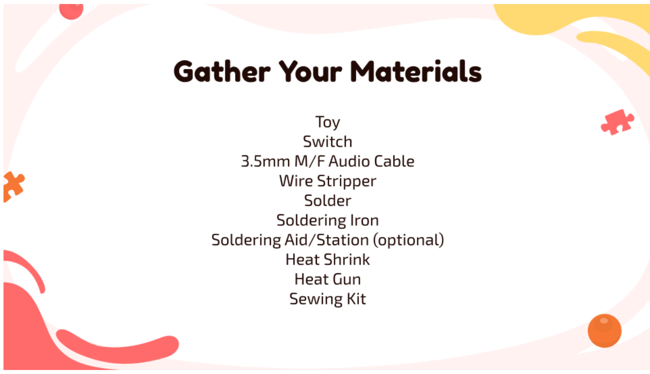

Crackin' Up Coco Monkey Switch Toy
SKU: CB71125SA
1 review
OUR PRICE: $45.13
Cuddle Barn - Crackin' Up Coco | Super Soft Animated Twirling Moving Monkey Stuffed Animal Plush Toy, Spins Around Making Monkey Sounds, 10 Inches
Visit the Cuddle Barn Store
1,388 ratings | 12 answered questions
Amazon's Choice for "animated stuffed animals"
Best Seller
$29.78
prime
& FREE Returns


What About a Battery Interrupter?
Battery interrupters can be used to make a toy switch accessible, too. However, the cost to switch adapt a toy once you've purchased the initial materials would be the most cost-effective option!
Battery Interrupter for Adapted Toys, Size"AA" or"AAA"
Brand: Enabled Solutions
171 ratings
2 Price Changes
$14.99
& FREE Returns

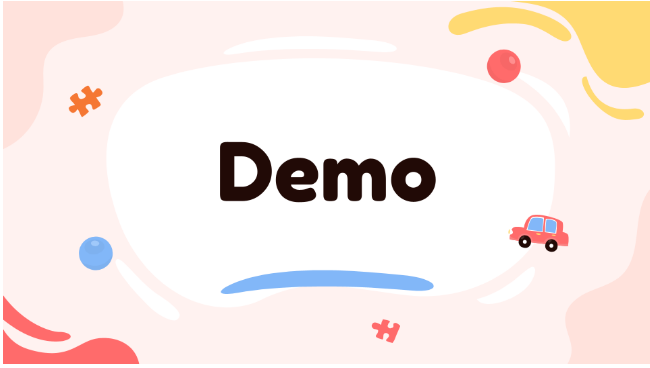

The Cost to Switch Adapt
The start up cost to switch adapt would be ~$115. However, after the initial cost, you should only need to purchase more shrink wrap, cables, and solder.
This makes switch-adapted toys more accessible for families.


Bonus: You can also create low-cost switches!
Off-the-Shelf
Vs
3D Printed
Cost can vary between $20-65+
According to theoddartisan on instructables.com, you can create your own 3D printed switch for $5.70.

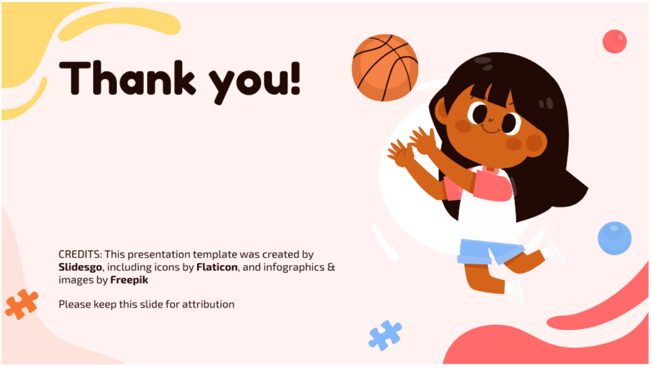

02
How
How do you switch adapt a toy?


Gather Your Materials
Toy
Switch
3.5mm M/F Audio Cable
Wire Stripper
Solder
Soldering Iron
Soldering Aid/Station (optional)
Heat Shrink
Heat Gun
Sewing Kit


Directions
Refer to handout for
step-by-step directions.


Demo


Questions?


Thank you!
CREDITS: This presentation template was created by
Slidesgo, including icons by Flaticon, and infographics &
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Appendix B

Excerpts from “Guide to Technology Use in Pediatric Rehabilitation”

Guide to Technology Use in Pediatric Rehabilitation

Created by Elizabeth Nguyen, OTS

Accessibility for School/Return to School

For patients with fine motor, visual-motor, and cognitive deficits, these applications may facilitate independence and participation in school:

Co:Writer	A Google Chrome and Microsoft Edge extension and iPad App used for word prediction and speech-to-text
EquatIO	A Google Chrome extension used to complete math work with speech-to-text and typing
Read&Write	A Windows, Mac, Google Chrome, Microsoft Edge, iPad, and Android extension/app used for reading text aloud and proofreading
Snap&Read	A Google Chrome, iOS Safari, and Microsoft Edge extension and iPad App used for adjusting readability of text and reading text aloud
SnapType	A Google Play and iPad application that allows users to take photos of worksheets and then type or draw on the worksheet on the iPad

You might introduce these applications or speak with your patient's school to practice with the tools they provide.

References

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Universally designed access, engagement & participation. (n.d.). PATINS Project. https://patinsproject.org/

Arcade 1Up Screen Infinity Game Table

This large touch screen game table can be used to:

- Motivate your patient to tolerate different positions (sitting upright, stance, prone on elbows, etc.) to play
- Improve problem-solving skills with games like 4 pics 1 word, Guess Who?, Memory, Puzzle Play, Super Word Search, and more
    - Create a 9, 16, 25, 36, 49+ piece puzzle on Puzzle Play!
- Facilitate upper extremity reaching to access game board
- Practice hand-eye coordination
- Facilitate play for patients that may not be able to use traditional game pieces
    - Try a stylus and universal cuff!

Descriptions for each game can be found on the Infinity Game Table Website. These games are currently available on the game table:

- 4 pics 1 word
- Checkers
- CLUE
- Doodle Monster
- Backgammon
- Chess
- Color Create
- Dots and Boxes
- Battleship
- Chicken Wrangle
- Connect 4
- Fling Hockey
- Candyland
- Chutes & Ladders
- Dizzy Tanks
- Game of Life
- Guess Who?
- Hungry Hungry Hippos
- Mahjong Deluxe
- Mancala
- Memory Matching Game
- Mini Fini Foosball
- Mini Golf
- Monopoly
- 9 Men's Morris
- Operation
- Othello
- Pirate Battle
- Puzzle Play
- Raceway Grand Prix
- Scrabble
- Simon
- Solitaire
- Sorry
- Spider Solitaire
- Sudoku
- Super Word Search
- Swish
- Tablecloths
- Tripeaks Solitaire
- Trivial Pursuit
- Trouble
- Whack-O-Moles
- What's the Word?
- Yahtzee
- Yokozuna All-Star

To set up this system:

1. Place the game table near an outlet and plug it in
2. Turn the table on using the power button underneath the infinity label *(volume controls are left of power button)*

3. Select a game
4. After selecting a game, you can click on the settings wheel icon to learn controls and rules for each game

ArmeoSpring

The ArmeoSpring System is an arm robot with springs that are adjustable and assist in supporting the upper extremity (Meyer-Heim & van Hedel, 2013). The arm robot is used with a computer program that facilitates game play to improve range of motion (ROM). Games can target global upper extremity ROM; isolated movements of the shoulder, elbow, forearm, or wrist; and grasp and release.

To use this system, your patient should be able to initiate and engage in upper extremity movements in the gravity-eliminated plane (Meyer-Heim & van Hedel, 2013). The system can be adjusted to fit your patient and the set-up is adaptable for wheelchair users.

The ArmeoSpring is located in the gym outside the therapy office. The occupational therapists onsite have been certified to use the system and can train you.

The manual, including information about set-up, games, and billing, can be found on the cart in the black binder.

References

Meyer-Heim, A., & van Hedel, H. J. (2013). Robot-assisted and computer-enhanced therapies for children with cerebral palsy: Current state and clinical implementation. *Seminars in Pediatric Neurology, 20*(2), 139-145. http://doi.org/10.1016/j.spen.2013.06.006

Lending Library

There is a nonprofit health care organization with locations across the United States that provides a variety of services and supports for individuals with disabilities to enable participation in their daily lives. The nonprofit established a project to increase access and awareness of assistive technology.

With the project, individuals throughout the state can:

- attend free trainings and earn Continuing Education Units (CEUs)
- request demonstrations to learn about devices, their features, and how they can be used to help a person
  - *can be done in-person or virtually*
- borrow from the loan library, including equipment such as:
  - adapted toys
  - communication devices
  - mounting devices
  - tablets
  - switches

Equipment can be borrowed for 30 days and loans may be extended to 60 days. Individuals can pick up equipment from the loan library or a representative can deliver or mail the equipment.

Borrowing and learning through demonstrations allows practitioners to trial equipment prior to recommending them to their patients. Families should also be reminded that these resources are available to them, too!

GestureTek Cube

The Cube is located in the Sensory Room. It is an interactive floor projection that detects movements such as stepping, jumping, kicking, and swiping. There are premade sequences in the program or you can customize your own based on your patient's preferences and goals. The Cube can be used to engage and motivate your clients to keep moving.

To use the Cube:

- Push the button on underside of the Cube to power computer on
- Use the remote to turn projector on
- Use power switch on the top of the Bluetooth keyboard to turn it on
- Select the application (circled in red below) on the desktop if it does not automatically start
- Select an "Active Sequence" and then select "RUN"
- To exit a sequence, hit "ESC" on the keyboard
- When you are done, turn off the projector, computer, and keyboard

**Refer to the quick user's guide above the computer/projector for more details*

References

GestureTek Health. (n.d.) *The Cube*. https://gesturetekhealth.com/products/sensory-fx/sensory-cube

Oculus Quest 2 Virtual Reality

Virtual Reality (VR) games are immersive, allowing users to engage in/with virtual environments. VR can be used to:

- assist in patient pain control (Hoffman et al., 2014)
- facilitate more intensive treatment as it provides a playful therapeutic environment that motivates children (Meyer-Heim & van Hedel, 2013)
- improve self-efficacy, self-confidence, and acceptance by peers and family (Miller & Reid, 2003)
- make bilateral arm training more interesting and fun (Do et al., 2016)

A binder of resources for the Oculus Quest 2 VR systems can be found in the PA office. It includes a clinical operations guide, billing/documentation guidelines, and an evidence table. The binder is on the VR TV cart and virtual copies were shared via email.

References

Do, J. H., Yoo, E. Y., Jung, M. Y., & Park, H. Y. (2016). The effects of virtual reality-based bilateral arm training on hemiplegic children's upper limb motor skills. *NeuroRehabilitation, 38*(2), 115-127. https://doi.org/10.3233/NRE-161302

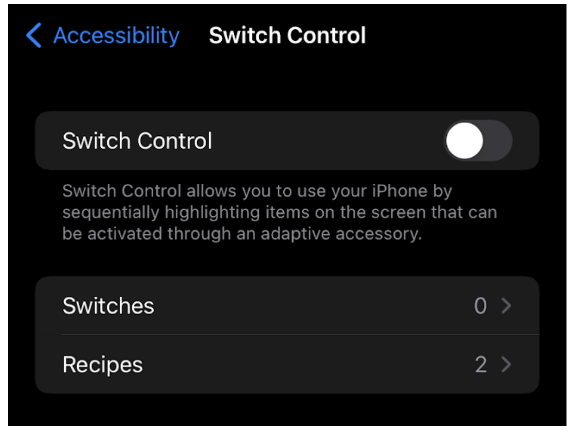
Hoffman, H. G., Meyer III, W. J., Ramirez, M., Roberts, L., Seibel, E. J., Atzori, B., Sharar, S.R., & Patterson, D. R. (2014). Feasibility of articulated arm mounted Oculus Rift Virtual Reality goggles for adjunctive pain control during occupational therapy in pediatric burn patients. *Cyberpsychology, Behavior, and Social Networking, 17*(6), 397-401. https://doi.org/10.1089/cyber.2014.0058

Meyer-Heim, A., & van Hedel, H. J. (2013). Robot-assisted and computer-enhanced therapies for children with cerebral palsy: Current state and clinical implementation. *Seminars in Pediatric Neurology, 20*(2), 139-145. http://doi.org/10.1016/j.spen.2013.06.006

Miller, S., & Reid, D. (2003). Doing play: Competency, control, and expression. *CyberPsychology & Behavior, 6*(6), 623-632. https://doi.org/10.1089/109493103322725397

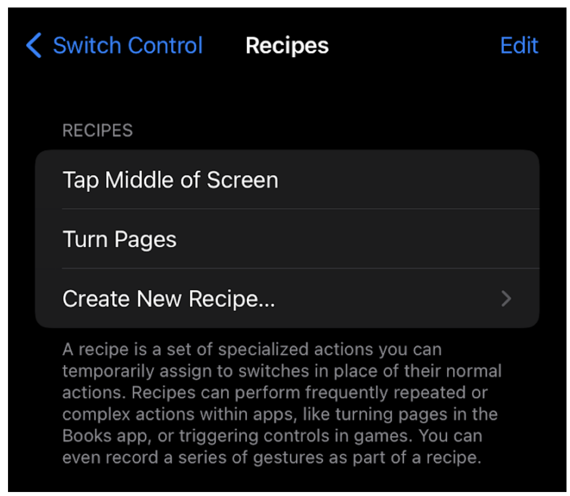
Phone Accessibility

Through Switch Control, you can set up an iPhone to be used with adaptive switches. Go to Settings > Accessibility > Switch Control and toggle it on. Add a new switch by clicking Switches. Select the source (external, screen, camera, back tap, or sound) and assign an action to that switch.



Additionally, you can create "recipes" to complete repetitive actions, allowing you to complete an action more efficiently. Luis Perez shares a how-to on making your own recipe [here](#).

For more information on how to set up and use Switch Control, visit this [link](#) and this [link](#) from Apple Support.



In order to use *external* switches with your iPhone, you will need a switch interface. Below are a few examples.

[Ablenet Blue2](#)

[Ablenet Hook](#)

[tecla-e](#)

[Tapio](#)

Another option for iPhone accessibility is Voice Control. This can also be found under Settings > Accessibility.

Using your voice, you can complete basic navigation through your phone (go home, open Siri, open control center, open <application name>), complete gestures (e.g., scrolling, zooming, tapping, swiping), dictate, control settings on your phone (e.g., volume, rotate, lock screen), and more.

For more information on how to use and set up Voice Control, visit this link from Apple Support and this link from iMore.

For the latest on face tracking and eye gaze for the iPhone and iPad, visit this link from AAC Community. As Apple continues to update its technologies, software developers are creating applications that make use of head tracking capabilities for internet browsing and communication.

- Jabberwocky and Jabberwocky Browser can be downloaded on iOS devices for speech-to-text and to browse the internet
- Jabberwocky - ALS and Spinal Injury Accessibility can be downloaded on Android devices to control devices with head movements

For accessibility for Android devices, visit this link for Voice Access and this link for Switch Access from Google Support.

For accessibility for Amazon Fire tablets, visit this link for general accessibility and this link for Switch Access from Amazon Support.

Switches

In addition to increasing phone accessibility, switches have other clinical implications.

- Toys and games can be switch adapted to facilitate play for individuals who have difficulty using them in a traditional manner
- Recordable switches can be used for communication
    - These come in single and multi-message options
- Smyle Mouse uses your webcam to track head and face gestures to move and click a mouse on a computer
- With an interface like the AbleNet Powerlink 4, switches can be used for environmental control (e.g., lights, appliances, TVs, etc.)
    - Visit this link for an environmental control unit selection guide
    - *Another option for environmental control is to utilize smart home devices like Alexa*

For an AbleNet lecture on switches and mounting them for access by Mary Sagstetter, M.A.Ed., visit this link or scan the QR code to the right.

There are a variety of switches to meet the needs of your patients. For more information about switches, visit this link. For tips on choosing a switch, visit this link from Enabling Devices.

Switches can be expensive. Consider borrowing a switch or 3D printing and assembling your own. The next few pages cover switch adapting a toy on your own!

How to Switch Adapt a Toy

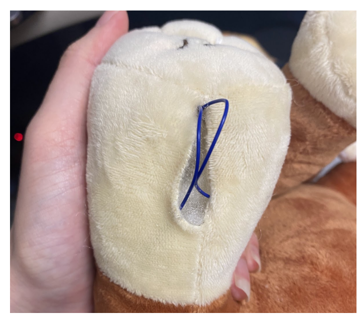
Materials Needed:

Toy
Switch
3.5mm M/F Audio Cable
Wire Stripper
Solder
Soldering Iron
Soldering Aid/Station (optional)
Heat Shrink
Heat Gun
Sewing Kit

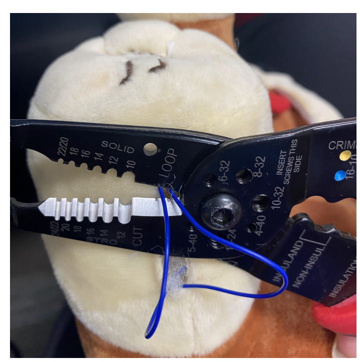
Directions:

1. Feel for the wires attached to the switch.

2. Cut the toy open to expose the wires.
3. Slightly pull the wires out of the toy.



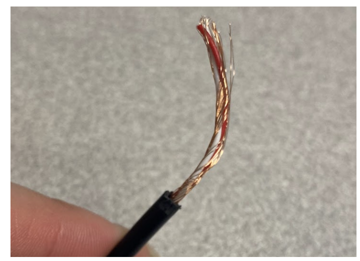
4. Use the wire stripper to cut the wires close to the switch.



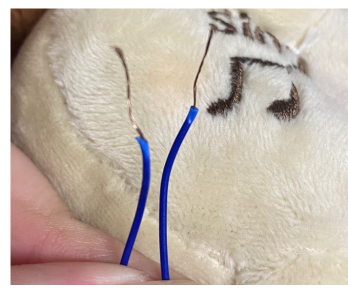
5. Pull the longer portion of the wire out of the toy to complete the following steps.

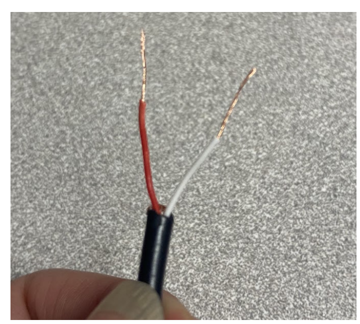
6. Use the wire stripper to cut the 3.5mm audio cable in half.
    a. You will use the female half. Save the male side for a different use.

7. Strip ~1.5" of the black plastic off the cable to expose the wires.



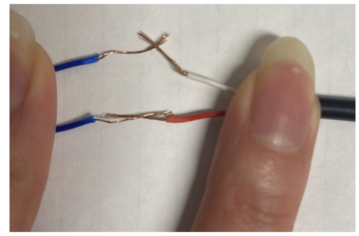
8. Strip the covering on the wires (from toy and cable) with your fingernails or carefully with nail clippers to expose ~1".

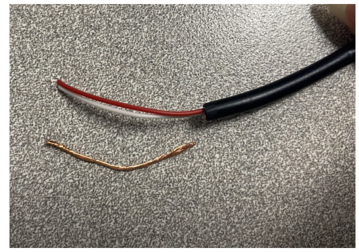




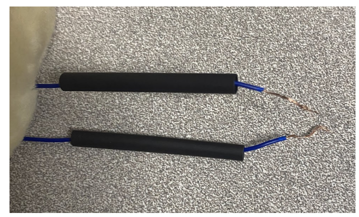
9. Insert an external switch into the female end of the cable.

10. Test connections between the toy and cable wires by touching wires together and activating the toy with the external switch.
    a. One wire from the cable will not be needed. Trim it down.
    b. Make note of which wires go together. You will twist them later.

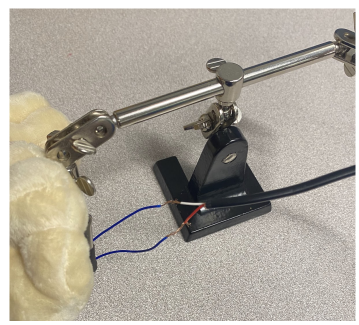




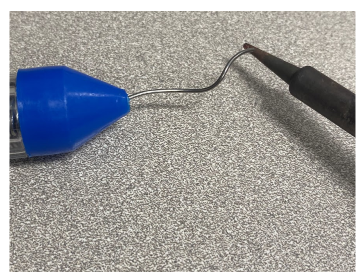
11. Thread larger heat shrink wrap down cable and then thread 2 smaller heat shrink wraps over each of the 2 wires (either toy or cable wires).



12. Twist the wire connections. You will have 2 sets of twisted wires.
13. If you have a soldering station/aid, you can clamp on each side.

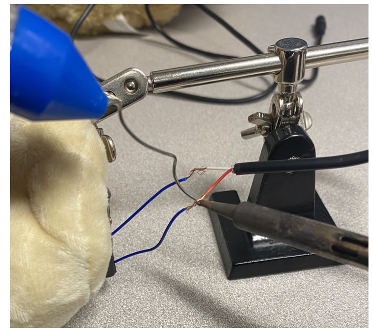


14. Turn the soldering iron on and allow it to warm up.
15. Tin the soldering iron by applying solder to the iron.



16. Clean the iron with a damp sponge or brass wire.

17. Solder the wires together using the solder and soldering iron.
    a. Hold the iron to the wires to apply heat. Hold solder to the wires to coat the wires.



18. Thread the smaller heat shrink wraps over the portion soldered.

19. Hold the heat gun over the heat shrink to seal.
    a. Be cautious and avoid heat application on the toy's fabric to prevent burning/fire.
20. Thread the larger heat shrink wrap over the 2 smaller ones and repeat.
    a. You can use electrical tape if you don't have large heat shrink.
21. Place the new wire into the toy and sew it closed with the female end of the cable exposed externally.
22. Wash your hands!

These steps will allow you to switch adapt a cause-effect plush toy. SWITCHED adapted toys is a YouTube channel with 15 videos on how to adapt popular toys, including a bubble machine and nerf gun. For a list of adaptable toys, you can browse through HuskyADAPT's videos. Another great resource for adapting toys is Makers Making Change.

3D Printing

3D printed solutions can allow patients to improve upper extremity skills, like typing and writing (Lee et al., 2019). 3D printed products can also be used to facilitate independence in ADLs for those with physical disabilities that make grooming and dressing difficult (Gallup et al., 2018). Moreover, 3D printed items are typically more cost-effective than commercial products (Gallup et al., 2018; Hunzeker & Ozelie, 2021).

The 3D printer in the PA office can be used to print adaptive equipment / assistive devices. Thingiverse, Makers Making Change, and My Mini Factory are a few websites where you can find free 3D printable designs. Using TinkerCAD, you can customize designs to meet the needs of your patients.

Examples of 3D Printed Assistive Devices / Adaptive Equipment:

ADLs / IADLs	Cup holder with wheelchair mount Enlarged zipper pulls Fork and spoon support Key turner	Medication bottle opener One-step wheelchair ramp Toothbrush grip Wheelchair lock extenders
Education	Pen holder	
Play / Leisure	Accessibility switch Sip-and-puff mouth joystick	Modular thumbstick extender PS5 one hand controller adaptation

References

Gallup, N., Bow, J., & Pearce, J. (2018). Economic potential for distributed manufacturing of adaptive aids for arthritis patients in the U.S. *Geriatrics, 3*(4), 89. https://doi.org/10.3390/geriatrics3040089

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Video Games (Wii, Xbox, Web Browser)

Evidence to Support the Use of Video Games:

Motivation	• Use of the Wii with patients following a total knee replacement – researchers found many OTs and PTs felt that use of the system could promote adherence to intervention (Fung et al., 2012). • "Children focused on the fun of games rather than their perception of being treated, because video-based games are interactive, providing visual and verbal feedback, are stimulating, and increase motivation and incentive of achievement" (Arman et al., 2019, p. 180).
Pain Reduction	• Arman et al. (2019) hypothesized that gaming reduced pain and facilitated engagement because it was fun • Kamel et al. (2021) agreed that pain and fear decreased because the children were enjoying themselves and the game.
Upper Extremity Rehab	• Use of the Wii in treatment of children with hemiplegic cerebral palsy – researchers found improvements in upper limb motor skills and bilateral coordination ability (Do et al., 2016) • Use of the Xbox Kinect in rehabilitation – improvement of client outcomes including upper limb strength and dexterity, range of motion, forearm supination, occupational performance, and occupational satisfaction (Arman et al., 2019; Kamel et al., 2021).

For children who have difficulty using off-the-shelf controllers, there are adaptive controller options!

The Xbox Adaptive Controller is customizable. Switches and joysticks can be inserted into each port to be used for various controls. The LipSync can be 3D printed and assembled for use with the adaptive controller.

For more information on adaptive gaming, visit this link from Craig Hospital. It includes resources on gaming controllers, user forums, game reviews, and adaptive gamers.

Active Wii Games:

Carnival Games	• Targets hand-eye coordinations skills and upper extremity movements • Some mini games require use of buttons, while others only require movement of the Wiimote
Cooking Mama: Cook Off	• Targets hand-eye coordination skills and upper extremity movements to "cook" • Complete skills like chopping, peeling, stirring, etc.
Dance Dance Revolution	• Targets endurance, attention, and strength and challenges vestibular system
EA Sports Active Personal Trainer	• Targets endurance and strength • Includes 25 exercises and activities, including tennis, volleyball, basketball, dancing, and inline skating
Guitar Hero	• Targets fine motor skills and coordination
Just Dance	• Targets endurance and coordination • Wii games utilize Wiimote tracking (one arm) • Xbox Kinect utilizes full body tracking via camera
Wii Fit and Wii Fit Plus	• Targets body awareness, balance, and coordination • Categories include yoga, strength training, balance games, and aerobics ◦ For more information on the exercises within each of these categories, visit this webpage • Wii Fit Plus also includes obstacle courses and martial arts
Wii Sports and Wii Sports Resort	• Targets hand-eye coordination • Original game includes tennis, baseball, golf, bowling, and boxing • Resort includes air sports, archery, basketball, bowling, canoeing, cycling, frisbee, golf, power cruising, swordplay, table tennis, and wakeboarding

**There are several other Wii games available but many are 3rd person adventure games that do not require as much physical activity*

Active Xbox Kinect Games:

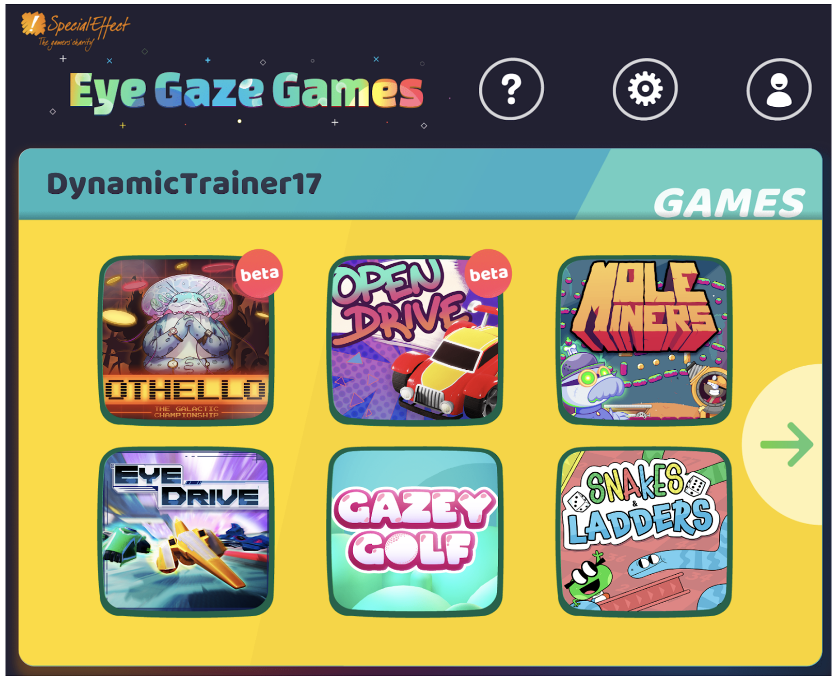
Just Dance	• Targets endurance and coordination • Xbox Kinect utilizes full body tracking via camera

Kinect Adventures	• Targets endurance, coordination, and full body movements
	• Includes 5 adventures
	    ○ 20,000 Leaks – plug leaks using arms and legs
	    ○ River Rush – control raft by leaning laterally and leap by jumping
	    ○ Rally Ball – use whole body to hit balls
	    ○ Reflex Ridge – most active; jump, duck, and dodge
	    ○ Space Pop – pop bubbles, flap arms to fly, lean to move laterally

Kinect Dance Central	• Targets endurance, strength, and gross motor imitation
Kinect Sports	• Targets hand-eye coordination • Includes boxing, track & field, soccer, table tennis, beach volleyball, and championship bowling
Motionsports	• Targets endurance and coordination • Includes football, skiing, boxing, soccer, horseback riding, and hang gliding
The Black Eyed Peas Experience	• Targets gross motor imitation and endurance • Dance to Black Eyed Peas songs
Your Shape Fitness Evolved	• Targets endurance, strength, balance, and coordination • Includes dancing, boot camp, martial arts, yoga, and more

Accessible Web Browser Games:

Eye Gaze Games is a website that allows you to play with switches or an eye gaze device.



Tar Heel Gameplay is another website with switch-accessible games like Tetris and Space Defense. You can also create your own "games" with YouTube videos. You can make videos pause and show a prompt; to start the video again, the user will press the prompt.

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Appendix C

Program Evaluation Survey Questions

1. What technology do you have increased knowledge on as a result of this experience?
    - Games to Play on the Wii
    - Games to Play on the Kinect
    - ArmeoSpring
    - Infinity Game Table
    - GestureTek Cube
    - 3D Printer
    - Adaptive Switches
    - Switch-Adapted Toys
    - Apps or Internet Browser Extensions for Accessibility (Speech-to-Text/Text-to-Speech, Word Prediction)
    - Other, please specify
2. Please indicate how strongly you agree or disagree with the following statements (strongly agree, somewhat disagree, neither agree nor disagree, somewhat agree, strongly agree):
    - I will borrow technology from the local organization's loan library in the future as a result of this experience.
    - I will recommend the loan library to my patients and their families as a result of this experience.
    - I feel confident that I can switch adapt a toy using the resources provided.
    - I feel more confident in choosing technology to use with patients after the in-services and resources provided.
    - I feel more confident in implementing technology with patients after the in-services and resources provided.
    - I intend to use technology with patients more frequently following this experience.
3. What barriers to using technology do you feel have been reduced through the in-services and resources provided?
4. What barriers to technology do you feel still exist?
5. What impact do you think the use of technology during this experience had on your patients?
6. What do you feel are the benefits of using technology in pediatric rehabilitation?
7. Do you have any additional comments, questions, or concerns you would like to share?