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Use of technology in the preschool setting : advocating the role of occupational therapy

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Use of Technology in the Preschool Setting: Advocating the Role of Occupational Therapy

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Note: This document describes a Capstone Dissemination project reflecting an individually planned experience conducted under faculty and site mentorship. The goal of the Capstone experience is to provide the occupational therapy doctoral student with a unique experience whereby he/she can demonstrate leadership and autonomous decision-making in preparation for enhanced future practice as an occupational therapist. As such, the Capstone Dissemination is not formal research.

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Introduction

Purpose

The purpose of this paper is to advocate for occupational therapy's role in implementing technology as a tool to assist preschoolers in developing educationally related skills. The issue will be explored through a variety of methods including a comprehensive literature review, numerous observations, questionnaires, semi-structured interviews, and meetings with stakeholders and key personnel. This will culminate in a publishable article intended for submission into the *American Journal of Occupational Therapy* (AJOT) "The Issue Is" section. It is hoped that the advocacy efforts contained in the following pages will be two-fold in that they will 1) strengthen the role of preschool based occupational therapy, and 2) highlight the profession as one that is able to evolve with and influence the technological advancements that affect occupational therapy practice.

Issue to be Discussed

In order to discuss the issue it is necessary to define some key concepts. Firstly, what is technology? One way to conceptualize technology is to identify the areas that it encompasses. For example, The American Occupational Therapy Association (AOTA) defines technology as "The combination of assistive, basic, complex, electronic and information, and rehabilitative and educational technologies" (2010c). While each of these areas can be defined in their own right, this paper primarily refers to rehabilitative and educational technologies as well as assistive technologies. Rehabilitative and educational technologies are modalities used as part of an overall education or rehabilitation plan where they serve as "...tool[s] for remediation or rehabilitation" (Cook & Polgar, 2008, p.5). An assistive technology device 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). This paper will demonstrate how recent technological inventions, such as the iPad®; a touch screen tablet computer designed and marketed by Apple, Inc., have the capacity to be used as rehabilitative and educational, or assistive technology devices within the preschool setting.

Identify the Framework that will be Used to Analyze the Issue

As school-based occupational therapy services “...contribute to the achievement of educational goals” (Royeen & Marsh, 1988), it is important to frame the issue in terms of an educational lens rather than a medical one. The occupational success of the child in the educational environment is an important focus of the school-based occupational therapist. A framework that can be applied to the role of the student and the responsibility of the therapist in the school setting will therefore be used. As such, the Role Acquisition Model (Mosey, 1986, Chapter 26) has been chosen to guide the issue.

The Role Acquisition Model is appropriate because of its emphasis on education and the teaching and learning process - primarily of “...those social roles required of the individual in the expected environment” (Mosey, 1986, p. 450). According to the model, essential roles required by an individual are: 1) family interaction; 2) activities of daily living; 3) play/ recreation/ leisure; and 4) work/ school. In the case of this paper, the model applies to the role of the preschool student within the expected environment of the educational institution.

Framework for Policy Analysis

Explain the Framework that will be Used to Analyze the Issue

In the Role Acquisition Model, the therapist is analogous to a teacher, while the client is viewed as a learner. The model is well-suited to those “...who have not learned how to

participate in required social roles or who wish to participate in these roles in a more effective manner” (Mosey, 1986, p. 450). A major assumption of the model is that humans have an intrinsic desire for exploration and mastery of their environment. The therapist encourages the client to experience both exploration and mastery through the two types of skills that make roles possible - task skills and interpersonal skills. Task skills involve the ability to manipulate the non-human environment, and interpersonal skills involve one’s behavior in relationship to others. Another key aspect of the model is that of temporal adaptation (or time management). Temporal adaptation dictates that in order to be successful, the client must be able to organize and balance their roles in a healthy way.

According to the Role Acquisition Model, learning of roles takes place from both a sociological perspective (a socialization process) and a psychological perspective. Socialization describes how roles are acquired, whereas the psychological dimension describes the learning process (Mosey, 1986, p. 451). The three elements of the socialization process are: 1) the person learning the role, 2) the agent (who is responsible for what is to be learned), and 3) the setting in which learning takes place. If desired roles are to be acquired there must be mutual respect between the agent and the learner; the agent must provide the learner with rewards, feedback, and opportunities for practice; and the learning environment should be conducive to exploration and mastery of the desired role or skill (Mosey, 1986, p. 451).

The psychological process involves the following 16 principles of learning:

- Principle 1 - “Learning is influenced by the individual’s inherent capacities, current assets and limitations, age, sex, interests, and past and present cultural group membership.”

- Principle 2 – “Attention and perception influence learning.”
- Principle 3 - “The learner’s motivation is important.”
- Principle 4 – “Learning goals set by the individual are more likely to be attained than goals set by someone else.”
- Principle 5 – “Learning is enhanced when the individual understands what is to be learned and the reason for learning.”
- Principle 6 – “Learning is increased when it begins at the individual’s current level and proceeds at a rate that is comfortable for the individual.”
- Principle 7 - “Active participation in the learning process facilitates learning.”
- Principle 8 – “Reinforcement and feedback as the consequence of action are important parts of a learning experience.”
- Principle 9 – “Learning can be enhanced through trial and error, shaping, and imitation of models.”
- Principle 10 - “Frequent repetition or practice facilitates learning.”
- Principle 11 – “Planned movement from simplified wholes to more complex wholes facilitates integration of what is to be learned.”
- Principle 12 – “Inventive solutions to problems should be encouraged as well as more usual and typical solutions.”
- Principle 13 – “The environment in which learning takes place is an important factor.”
- Principle 14 – “There are individual differences in the ways anxiety affects learning.”
- Principle 15 – “Conflicts and frustrations...must be recognized and provision made for their resolution or accommodation.”

- Principle 16 – “There needs to be continuity between the learning situation and the experience for which the learning constitutes preparation.” (Mosey, 1986, pp. 451-452)

The sociological and psychological perspectives are interrelated and both are necessary for the successful learning of roles.

Discuss how this Framework has been Used in the Past to Analyze Issues

There is little research directly citing the Role Acquisition Model (Mosey, 1986, Chapter 26), perhaps due to the fact that Mosey emphasized informal observations over standardized assessments. Nevertheless, the language associated with the model can be found throughout occupational therapy literature. One important piece of literature that references Mosey (1986) is the *Occupational Therapy Practice Framework: Domain and Process, 2nd Edition (Framework–II)* (2008). The *Framework* “is an official document of the American Occupational Therapy Association (AOTA). Intended for internal and external audiences, it presents a summary of interrelated constructs that define and guide occupational therapy practice” (AOTA, 2008, p. 625). Roles appear as one of four performance patterns listed under the domain of occupational therapy (the others being Habits, Routines, and Rituals). Also, Mosey’s (1986) interpretations of Work, Social Participation, and Family are adopted by the *Framework* as the official definitions of these areas of occupation. The *Framework* is often used by occupational therapy practitioners as a guide for occupational analysis. The fact that Mosey’s (1986) definitions are included in the language of the *Framework* implies that practitioners are utilizing the work of Mosey (1986) whether directly or indirectly.

Another example in which Mosey (1986) is referenced includes Cole (2005), where the value of the Role Acquisition Model in relationship to group intervention is suggested. In

relation to pediatric therapy, Mosey (1986) is cited by Luebben and Royeen (2010) in their frame of reference for skill acquisition. According to Luebben and Royeen (2010), the skill acquisition frame of reference is a combination of learning theory concepts taken largely from the fields of behaviorism, cognitive science, and neuroscience. Through the teaching and learning process and activities (activity analysis and synthesis), the therapist can identify what the child needs to learn and then use reinforcement to shape desired skills and behaviors until mastery is accomplished (Luebben & Royeen, 2010).

Describe how Occupational Therapy Practitioners can Use this Framework

Occupational therapy practitioners may use the Role Acquisition Model (Mosey, 1986, Chapter 26) alone or in conjunction with other models of practice. It is important to point out however, that as an acquisitional model, learning is viewed as discrete non-sequential units that build upon one another rather than occurring along a continuum (as developmental models propose). Mosey (1986) explicitly states that the model “should probably not be used as the initial reference for individuals who have severe deficit[s] in motor function, sensory integration, and perhaps psychological function” (p. 450).

Many of the learning principles mentioned above are relevant to school-based occupational therapy and are naturally incorporated into practice. For example active learning is always taking place in the school environment (principle 7) and practitioners frequently implement creative interventions to facilitate learning (principle 12), especially at the preschool level.

Mosey (1986, p. 452) identifies atypical development as occurring when the environment is not conducive to learning or when a role pattern has been interrupted. She also identifies

continuums of function and dysfunction across seven major areas: 1) task skills, 2) interpersonal skills, 3) family interaction, 4) activities of daily living, 5) school, 6) work, 7) play, leisure/recreation, and 8) temporal adaptation. Occupational therapists who wish to use this model may refer to the relevant continuum in order to identify and evaluate problem behaviors or areas for concern. In regards to preschool occupational therapy, the continuum of play/ leisure/ recreation (in addition to school) is very important as learning typically takes place through meaningful play-based occupations.

The Issue

Identify and Discuss the Issue, Describing the Historical Background and how the Issue has Evolved Over Time

Modern technology has become a routine part of the lives of individuals with and without disabilities, as well as society as a whole. According to the Assistive Technology Act of 2004:

Technology is one of the primary engines for economic activity, education, and innovation in the Nation, and throughout the world. The commitment of the United States to the development and utilization of technology is one of the main factors underlying the strength and vibrancy of the economy of the United States.

As documented by various scholars, the profession of occupational therapy has always been committed to the development and utilization of technology (Hammel & Angelo, 1996; Smith, 1991; Trefler, 1987; Vanderheiden, 1987). According to Smith (1991), “Before the current age of computers, therapists applied handmade technology which was often constructed in their own clinic workshops” (p. 750). Smith (1991) cites literature from the 1940’s and 1950’s detailing low-technology applications from within the field of occupational therapy, including the

Adaptation of Media (Brokaw, 1948), and Toys for Children with Cerebral Palsy (Craig & Hendin, 1950). This evidence attests to the longstanding relationship between occupational therapy and the provision of technology.

More recently, the rapidly changing nature of technology has led to discussion about the technology competencies required for occupational therapy practitioners. In 1987, Treffler stated that there is now more technology to choose from, but it also tends to be more complicated, sophisticated, and expensive (p. 697). Similarly, Vanderheiden (1987) acknowledged the greater opportunities modern rehabilitation technologies can provide, but cautioned that new skills and adjustments were necessary to ensure the effective use of such technologies. These authors also dispelled the flawed notion that technology alone is a panacea for clients' problems. Instead they recognized that in order for technology to be successfully incorporated into the lives of individuals with disabilities, clients must receive accompanying training, education, and resources (Treffler, 1987; Vanderheiden, 1987). In a 1996 article, Hammel and Angelo suggested guidelines for technology competencies within the profession of occupational therapy "...based on the premise that all OTPs [occupational therapy practitioners] should be able to incorporate basic technologies into their daily practice" (p.35). The authors outlined two *types* of competencies (general information and assistive-technology related), three *levels* of competency (entry/ basic, intermediate, and advanced), and three competency *areas* (evaluation, intervention, and resource coordination). These guidelines reiterate the need for skilled involvement in the therapeutic application of technology - a perspective that may be forgotten when the focus is on the technology itself (Treffler, 1987).

At present, there are three major arms of technology within the profession of occupational therapy – 1) assistive technology, 2) telehealth, and 3) technology enhanced interventions (J. Cason, personal communication, February 4, 2013). While assistive technology and technology enhanced interventions are fairly common, telehealth is an emerging area both within the field of occupational therapy and healthcare in general. According to AOTA, telehealth is “...the application of evaluative, consultative, preventative, and therapeutic services delivered through telecommunication and information technologies” (2012c). This model of healthcare delivery allows services to be provided without both parties having to be physically present at the same location (AOTA, 2012c). Although not the cardinal branch of technology considered in this paper, any discussion about the history and evolution of technology in occupational therapy would be incomplete without recognizing this emerging model.

Opportunities for occupational therapy involvement in assistive technology, telehealth, and/ or technology enhanced interventions exist across all areas of occupation defined in the *Framework: Activities of Daily Living (ADLs); Instrumental Activities of Daily Living (IADLs); Rest and Sleep; Education; Work; Play; Leisure; and Social Participation* (AOTA, 2008). Additionally, occupational therapists may provide technology services along a number of continuums including low to high; hard to soft; minimal to maximal; appliance versus tool; commercial to custom; general to specific; and assistive versus rehabilitative/ educational (Cook & Polgar, 2008). Given the increased depth and breadth of technology applications available to persons with disabilities over the last 25 to 30 years (Cook & Polgar, 2008, p. 4), services are often provided within the context of a service delivery team. Other disciplines on the team may include engineers, technologists, and durable medical equipment dealers. Occupational therapists

collaborate with these professionals in the “...evaluation, design, fabrication, customization, modification, and application of new or existing technologies and environmental interventions” (AOTA, 2010c). Within this context, it has been said that occupational therapists contribute a unique and holistic approach to the service delivery process, focusing on the functional living skills of persons with disabilities (Trefler, 1987; Smith, 1991).

It is hoped that this brief historical overview will highlight the profession’s ongoing efforts to accommodate the technological needs of those with disabilities. As stated in *AOTA’s Centennial Vision and Executive Summary*, one way that occupational therapy can demonstrate its value is by “Meeting societal needs for health and well-being” (AOTA, 2007, p.614). This is a commitment that will in turn, help to move the profession forward. The discussion will now turn to legislation affecting technology in school settings.

The Individuals with Disabilities Education Improvement Act of 2004 (IDEA) and Section 504 of the Rehabilitation Act of 1973 are two key pieces of legislation which affect children’s access to assistive technology and occupational therapy services in school settings. Under Part B of IDEA, public schools are required to provide eligible children with disabilities (ages 3-21) a free appropriate public education (FAPE) in the least restrictive environment (LRE) (IDEA, 2004). Central to IDEA is the individualized education plan (IEP) which describes the student’s unique educational needs, including the provision of related services, and assistive technology (IDEA, 2004). Under Section 504 of the Rehabilitation Act (1973), any educational setting receiving federal funds must provide reasonable accommodations to students with disabilities if needed to ensure equal access and opportunities. As members of the education team, occupational therapists may collaborate with families, special education

teachers, psychologists, and other therapists and professionals, to make decisions about the students' needs, including the need for assistive technology. It is also important to note that outside of any assistive technology written into the IEP, the explosion of mainstream educational technologies in today's market may potentially benefit both students with and without disabilities. School based occupational therapists can take advantage of these new technologies to carry out technology enhanced interventions.

Identify and Describe the Individuals Involved in the Issue

In order to explore the subject of technology use in preschool-based occupational therapy, information was gathered from several individuals. These individuals were contacted because they are involved either directly or indirectly with the issue, and each brings a unique perspective to the forefront. Information was gathered through multiple methods including semi-structured interviews, questionnaires, personal interactions, meetings, and unstructured observations. The following is a list of those persons involved organized by date:

- Tina McDermott, OTR/L, Occupational Therapist at Crossgates Preschool. 3901 Shadylawn Drive, Toledo, Ohio 43614. (January 11, 2013 – April 25, 2013).
- Lori Reffert, Ph.D, Acting Director of TPS Preschool. 3901 Shadylawn Drive, Toledo, Ohio 43614. (January 11, 2013 – April 25, 2013).
- Kelly Standerling, M.Ed, Early Childhood Supervisor. 3901 Shadylawn Drive, Toledo, Ohio 43614. (January 11, 2013 – April 25, 2013).
- Anonymous speech therapists, teachers, students, and parents at Crossgates Preschool. 3901 Shadylawn Drive, Toledo, Ohio 43614. (January 11, 2013 – April 25, 2013).

- Kimberly Alexander, M.Ed, Apple Specialist at MacCafé. 4405 Talmadge Rd. Toledo, Ohio 43623. (Interviewed January 23, 2013).
- Melanie Criss, OTD, OTR/L, Owner of Community Therapy Services, LLC. Clinical Instructor/Coordinator of Fieldwork and Professional Development, Occupational Therapy Doctorate Program, The University of Toledo. (Interviewed January 24, 2013).
- Faith Hairston, MLIS, Manager, Kent Branch Library Access Center, Toledo-Lucas County Public Library. 3101 Collingwood Blvd Toledo, Ohio 43610. (Interviewed January 30, 2013),
- Jan Connell, MLIS, Children's Librarian, Main Library, Toledo-Lucas County Public Library. 325 N. Michigan St. Toledo, Ohio 43604. (Interviewed January 30, 2013).
- Thomas Smet, MFAc, App Developer, Wisconsin. (Interviewed February 3, 2013).
- Jana Cason, DHS, OTR/L, Associate Professor, Auerbach School of Occupational Therapy, Spalding University. (Interviewed February 4, 2013).
- Kimberly Blunt, M.S., CCC/SLP, Orlando, Florida. (Email interview, February 11, 2013).
- Kelly Van Singel, Educator, iTaalk Autism Foundation. 2040 W. Central Avenue, Toledo, Ohio 43606. (Email interview, February 13, 2013).
- Karen Jacobs, EdD, OTR/L, CPE, FAOTA, Clinical Professor and Program Director of the Online Post-Professional Occupational Therapy Programs, Boston University. (Interviewed February 25, 2013).
- Christine Coleman, Assistant Principal, Beverly Elementary School- Toledo Public Schools. 3548 S. Detroit Avenue, Toledo, Ohio 43614. (February 26, 2013).

- Kristin Haney, M.Ed, Middle School Teacher, Arlington Elementary School- Toledo Public Schools. 707 Woodsdale Avenue, Toledo, Ohio 43609. (February 27, 2013).
- Dennis Clearly, MS, OTD, OTR/L, Academic Fieldwork Coordinator, The Ohio State University. (Interviewed March 5, 2013).
- Matthew Daniels, Faculty Technology Coordinator, English Faculty, St. John's Jesuit High School & Academy. 5901 Airport Highway, Toledo, Ohio 43615. (Interviewed March 6, 2013).
- Michele Nixon, M.Ed, Learning Specialist, St John's Jesuit High School & Academy. 5901 Airport Highway, Toledo, Ohio 43615. (March 6, 2013).

Through interactions with the individuals named above, the author was able to explore several avenues related to this advocacy project. Feedback from therapists, teachers, and parents about the use of technology in preschool was collected and analyzed, and its effects on students were observed and discussed. Preschool technologies were distinguished and information about their benefits and drawbacks was weighed. Technologies used in K-8 settings were also distinguished in order to gather a working knowledge of the technologies preschoolers might be exposed to when they transition to kindergarten. Inquiries at community settings that use technology to teach children, such as the library featured, provided insight into how the issue crosses over to other institutions that preschoolers may attend. Staff from a high school that has successfully implemented a device for every learner initiative furnished helpful information on the management of multiple devices while technology professionals and organizations shared their thoughts on the issue. Finally occupational therapy professionals and leaders in the field who are involved with iPad[®]/ tablet research and programming and/ or the emerging area of

telehealth provided their perspectives on the use of technology as an intervention tool (see Appendix A for summaries of interviews and observations related to this advocacy project as well as the section *Analyze the Issue* for further details).

Identify and Describe the Public or Private Organizations/ Systems that Affect the Issue

In addition to the federal laws (discussed earlier) which mandate the provision of special education and assistive technology in the United States, there are many systems that affect the issue.

Culturally, the technological advancements of society as a whole affect the issue of technology use among students with disabilities. According to the Assistive Technology Act of 2004, “Any development in mainstream technology will have profound implications for individuals with disabilities in the United States”. One such example has been the introduction of the Apple iPad[®], which was first released in 2010. This device, along with subsequent iterations, has experienced considerable mainstream success and is now being utilized in education and therapy clinics nationwide. Interested parties may visit Apple’s website to access numerous resources dedicated to iPad[®] in special and regular education. Another cultural factor that influences the issue is the attitude of school personnel towards educational technologies. As stated by Bitner and Bitner (2002), “Before technology can effect changes in the classroom, those ultimately responsible for the classroom must be considered. Teachers must learn to use technology and must allow it to change their present teaching paradigm” (p. 95). In a similar manner, school therapist’s attitudes can influence the adoption and utilization of technology enhanced treatment interventions.

Lastly, practical matters such as funding and technical support for the adoption of technology in schools inevitably affect the issue. In the current time of sequestration, funding may be particularly challenging. Based on an analysis by the Center on Budget and Policy Priorities, the National Education Association (NEA) predicted that Federal Education Programs would be cut by \$3 billion dollars as a result of the sequester. In the state of Ohio, Preschool Grants would be reduced by \$626,000 while Special Education Grants to States would be reduced by over \$22 million (NEA, 2013).

Identify and Discuss any Groups or Organizations that are Already Involved in the Issue

There are numerous groups and professional organizations involved in the issue. At the governmental level, The Office of Special Education Programs (OSEP) and the website Disability.gov contain resources regarding technology for persons with disabilities. The OSEP “supports a comprehensive array of programs and projects authorized by the Individuals with Disabilities Education Act (IDEA) that improve results for infants, toddlers, children and youth with disabilities” (OSEP, 2013). One such project is the Family Center on Technology and Disability (FCTD), which offers information and services related to assistive and instructional technologies. Disability.gov on the other hand is more general in its scope, providing “comprehensive information on disability programs and services in communities nationwide” (Office of Disability Employment Policy, 2013). Information regarding technology in general-education can be found via The Office of Educational Technology’s (OET) website. The OET “provides leadership for transforming education through the power of technology” (OET, 2013). A major priority of the OET is to promote “equity of access by ensuring a device for every learner and supporting broadband connections where they live and learn” (OET, 2013).

Resources pertaining to the issue, including how technology can be used to enhance teaching and learning, can be found on the OET's website.

Two professional organizations involved in the issue are the Rehabilitation Engineering and Assistive Technology Society of North America (RESNA) and the American Occupational Therapy Association (AOTA). As stated by RESNA President Alex Mihailidis, RESNA is "...the premier organization for professionals and researchers with the common mission of maximizing the health and well-being of people with disabilities through technology" (2013). RESNA's website contains a wealth of information for professionals and consumers regarding assistive technology and rehabilitation engineering, as well as links to external websites for further reference. Occupational therapy practitioners may visit AOTA's website and refer to the Special Interest Sections (SISs) related to Technology (TSIS) and Early Intervention and School (EISSIS) to access quarterly newsletters, discussion forums, and networking communities related to the issue. Therapists may also review AOTA's official document regarding technology and environmental interventions, and visit the Children and Youth practice area to learn more about occupational therapy's role in early childhood and school-based practice.

At the local level, organizations such as The iTaalk Autism Foundation and The REMLE Project, are promoting the use of interactive technology with children with special needs. Both organizations were founded by parents of children with autism in response to the positive impact touch screen technology has had on their children's lives. iTaalk educator Kelly Van Singel believes that "Because the iPad is so multisensory and accessible for users of any ability, it's a game changer" (personal communication, February 13, 2013). Services provided by iTaalk (located in North West Ohio) and The REMLE Project (located in Nashville, Tennessee), include

education about interactive devices and apps, and assistance with the purchasing of interactive devices. Further information about services and resources offered can be accessed through each party's respective websites.

Finally, there a number of public and private schools that are leading the way as far as integrating technology into the classroom. These schools may be equipped with features such as Wi-Fi, surround sound, document cameras, and SMART Board interactive whiteboards throughout their buildings. SMART Boards work by displaying the screen images from a connected computer onto a whiteboard surface via a projector. The user can then interact with the white board surface directly through the input/ touch of a finger or pen.

One also doesn't have to look far to access the growing number of media reports featuring schools that have adopted "device for every learner" initiatives. Depending on the school district, the devices may be funded by the school, by parents, or by a combination of both. Another related concept is bring your own device (BYOD). BYOD policies allow the student to bring in personally owned devices into the educational setting and use them to access class materials and content. These policies were first adopted by many businesses and workplaces before making their way into schools.

Identify the Resources that Exist Related to the Issue

In addition to the resources mentioned in the section above, readers may refer to the accompanying annotations assignment for a collection of sources related to the issue. Those interested in a particular device are encouraged to visit the manufacturer's website directly. These websites (including apple.com, smarttech.com, and mimio.com) often have dedicated sections related to educational and/ or assistive technology.

Analyze the Issue

Analyze the Issue Using the Selected Framework

According to AOTA, school-based occupational therapy practitioners “...use their unique expertise to help children to prepare for and perform important learning and school-related activities and to fulfill their role as students” (2010b). The Role Acquisition Model, with its emphasis on teaching and learning principles, provides an appropriate lens to analyze how technology can be used to facilitate these educational outcomes and therefore children’s roles as students. In preschool settings in particular:

Practitioners support the achievement of developmental and learning outcomes for children by facilitating social skills development, motor development, self-regulatory skills, emergent literacy, and the development of adaptive and self-care skills.

Occupational therapists are particularly skilled in helping children access curricular activities by contributing to the design and planning of activities, including identifying any needed accommodations or modifications (AOTA, 2010a).

Play is one of a child’s major occupations and the primary means by which the above developmental and learning outcomes are both facilitated and accomplished in the preschool setting (AOTA, 2011). In fact, “Through exploration of the environment and spontaneous engagement in meaningful activity, children develop social, emotional, cognitive and physical skills that provide the foundation for later role expectations” (Haertl, 2010, p. 278). This compliments one of the central tenets of the Role Acquisition Model – to encourage the client to experience both exploration and mastery through the development of skills that make roles possible (Mosey, 1986, Chapter 26). Preschool play occupations may include imaginative or

pretend play, manipulative play, and sensory-rich play e.g. blocks, stacking rings, shape sorters, push and pull toys, balls, books, sand, water, large beads, movement games, toy cars/trucks, train sets, and musical toys (AOTA, 2012b). Technology has long been used as a tool to increase participation in these important play-based occupations for children with varying special needs. Occupational therapists may employ low-technology solutions such as modifying seating positions, applying Dycem[®] and lap tables to hold toys, and using enlarged toys and game pieces; and/ or high-technology solutions such as computers and augmentative communication systems, mobility devices, and modified sports equipment (Haertl, 2010, p. 294). When technology is used to help support functional independence in this manner it is referred to as assistive technology - this is how occupational therapists have traditionally applied technology in the school setting. According to Smith (1991) however, in addition to helping, technology has a second major role: teaching. Technologies that help to teach are referred to as rehabilitative or educational technologies (see Introduction for definition). In comparison to assistive technologies which help the client to perform a function, rehabilitative or educational technologies facilitate progressive skill development (Smith, 1991). With the variety of rehabilitative/ educational technologies available in today's market, there are growing opportunities for occupational therapists to incorporate technology enhanced treatment interventions into practice. These interventions would not replace imaginative/pretend, manipulative, and sensory-rich play, but would be used alongside these approaches as yet another tool in the therapist's proverbial "bag-of-tricks".

An exploration into the use of technology in preschool was carried out at a public preschool in the Northwest Ohio region during Spring 2013. Information from therapists,

teachers, students, and parents was gathered via observations, personal interactions, semi-structured interviews, and/ or questionnaires in order to gather a working knowledge on the subject. In the Fall of 2012 the preschool adopted an iPad[®] pilot program in which a group of therapists and teachers were selected to receive iPads[®] for classroom/ therapeutic use. The pilot program was still underway at the time of this exploration.

Questionnaires regarding the use of technology in preschool therapy were administered to four therapists (1 occupational therapist and 3 speech therapists). All four used the iPad[®] in therapy either every day or several times per week. Three of the four therapists used it with more than 20 students per week while one used it with 6-9 students per week. Therapeutic uses for the device included fine motor/ visual perceptual development; receptive/ expressive language development; cognition; attention; social skills development; communication board; and visual scheduling. All agreed they would like to use the iPad[®] more frequently in treatment. Other technologies that therapists reported using were Leapfrog[®] educational products and VTech[®] educational products. Both Leapfrog[®] and VTech[®] produce technology-based educational products and content for children ages birth to approximately 8-9 years old. Their products include touch screen learning tablets and apps, as well as manipulative toys. Low technology products used by therapists included classroom materials (e.g. toys, blocks, crafts), and picture card flip books with stimulus words. When asked to state the benefits of using the iPad[®] device, therapists commented on its ability to engage/ interest students, provide immediate cause and effect, and encourage learning through seeing/ doing via the visual-tactile interface. Therapists also remarked on the convenience of storing multiple materials in once place, user-friendliness of the device, and the reduced set-up involved - leaving more time to work with/ observe the

students. Limitations included some students becoming over excited/ perseverative over the device, students switching between apps, and not wanting to try other things. A lack of resources to buy apps, limited technical support, and resistance from traditional teachers was also mentioned.

Overall, feedback from therapists suggests that iPad[®] is being used successfully with multiple students to work on a diverse range of skills in this particular preschool setting. Therapists point to the many options/ materials afforded when using the device as well as the level of student engagement garnered. Student engagement is an important factor that relates to learning principles 3 and 7 of the Role Acquisition Model. These principles state that the learner's motivation and active participation are key in facilitating the learning process. Therapist's responses also point to the clinical judgment and decision making skills required in determining how best (or whether or not) to apply iPad[®] technology to the child's needs; it may be that the device is not appropriate or therapeutic for every child. Also funding, technical issues, and attitudes towards technology are factors that can affect the success of technology related interventions; please refer to the section *Identify and Describe the Public or Private Organizations/ Systems that Affect the Issue* for a discussion on these topics.

Preschool special education teachers were also asked about their use of classroom technology via a questionnaire. The two most common types of technology being used were personal computers and audio players (CD, tape player, or MP3). Televisions, laptops, and iPads[®] were used to a lesser extent. There were also four teachers who reported using one of the following: smart phone, digital camera, record player, and scanner. When asked which additional technologies would more fully address their teaching needs, most teachers selected SMART

Boards, followed by iPad[®]s. Common obstacles to integrating technology into the classroom were felt to be a lack of funding, training, and technical support, as well as malfunctioning equipment and/or software; these obstacles are similar to those stated by therapists in the paragraph above. Group trainings and peer demonstrations were the most frequently identified supports that would help teachers to use technology more effectively in their classrooms, followed by one-on-one sessions. As for when teachers would most likely attend a technology workshop/ training session, answers varied from during summer break to during the school day.

As therapists are often guests in the classroom, it is important for them to know what types of educational technologies are available and being used in the classroom environment. This may be the only time therapists have access to certain technologies (e.g. SMART Boards) for intervention and hence utilize them to support the needs of all students, with and without disabilities. Therapists may collaborate with teachers, for example, in the development of technology enhanced handwriting or social skills interventions for the entire class. They may also implement universal design for learning principles (UDL) through the use of technology. UDL is “a set of principles for curriculum development that give all individuals equal opportunities to learn” (CAST, 2012b). According to CAST (2012a) “powerful digital technologies applied using UDL principles enable easier and more effective customization of curricula for learners.” For example, technology may be used as a tool to implement the first principle of UDL, which is to provide learners with multiple means of representation. UDL concepts are consistent with the Role Acquisition Model, which identifies the environment as critical in the learning process (Principle 13).

In order to investigate the issue further, surveys were administered to a convenient sample of 123 parents of preschoolers receiving special education services. The survey was designed to gather information about parents' use of technology and their attitudes towards technology. Sixty-eight parents (55%) responded over a three-week period and response frequencies were calculated (see Appendix B for the response frequencies associated with each survey item). Over 95% of parents reported owning a home computer or tablet, while more than 93% reported having home internet access. A majority of parents (76.5%) believed that they had good computer skills and 70.6% reported having a child that plays games on a home computer or tablet. Most parents believed that technology should be used as a tool to teach children (86.8%) and that educational technology should be funded within the schools (80.8%). When asked if they would be interested in technology training classes, 53% of parents either agreed or strongly agreed. Responses suggest that computer/ tablet technology and internet access are available in many homes and parents tend to be savvy in basic computer skills. Many parents are supportive of the funding and use of educational technologies as teaching methods, and allow their children to use technology at home. A notable portion of parents also indicated they would like to learn (or learn more) about technology.

The above parent survey data can be used to promote collaboration between parents, therapists, and teachers in regards to preschoolers' learning through educational technologies. Principle 16 of the Role Acquisition Model pinpoints the need for continuity "between the learning situation and the experience for which the learning constitutes preparation" (Mosey, 1986, pp. 451-452). Occupational therapists can therefore have a role in recommending appropriate apps/ computer games/ programs to parents in order to support continuity between

learning at home, and the technology enhanced interventions being used in schools. Therapists can also train parents on how to operate these apps/ programs and the devices on which they run (e.g. iPad® tablets). Again, the purpose would not be to promote learning solely via technology, but to include technology as one option among a variety of intervention tools and approaches (e.g. imaginative/ pretend, manipulative, and sensory-rich play). On the survey a handful of parents expressed concern over this issue and the amount of screen time their preschoolers encounter. In contrast, one parent commented on how much their child has learned via tablet technology. Opinions vary on the issue of screen time and a number of resources exist for parents and professionals interested in this topic. The American Academy of Pediatrics (AAP) and The Center on Media and Child Health (CMCH) at Children's Hospital Boston, for example, both provide information, tips, and guidelines for responsible screen time management. Lisa Guernsey, a parent, and technology and education journalist also sheds light on the issue in her book *Screen Time: How Electronic Media – From Baby Videos to Educational Software – Affects Your Young Child*.

In order to gain a first-hand perspective of the preschool iPad® pilot program, numerous observations of (and interactions with) students using the technology were carried out. The iPads® were incorporated as one of several intervention tools utilized by therapists and teachers in the delivery of preschool special educational services. Students used the devices in a structured environment under the supervision of a therapist or teacher in either a one-to-one or small group setting. Therapists and teachers were autonomous in how they chose to use the devices as long as it was in accordance with the student(s) IEP goals. A combination of third party applications and built in features of the iPad® devices were used. Built in features that

were used include the ability to upload videos, photos, and music directly to the device; third party applications varied depending on the needs of the child.

In occupational therapy, the iPad[®] was used both as an assistive technology device and as a tool for technology enhanced interventions. Examples of assistive technology applications include *Answers: Yes/No HD* by Simplified Touch. This app allows the iPad[®] to be used as a switch so that users can make a choice between simple yes/ no or this/ that questions by touching the corresponding word or image. The app is marketed towards individuals with communication disorders and was originally designed to “provide an easy to use, affordable way for a nonverbal young man with autism and motor planning issues to communicate with those around him” (Simplified Touch, 2013). *iEarnedThat* by Kidoc, LLC is another assistive technology application that allows the iPad[®] to be used as a reward chart. The app was designed by a pediatrician and a parent as a motivational tool to help children develop desirable behaviors by working towards tangible goals (Kidoc, 2013). A picture of a desired goal is turned into a 3D puzzle that children can work towards one puzzle piece at a time. A final example of an assistive technology application is *First Then Visual Schedule* by Good Karma Applications, Inc. This app was designed for caregivers to provide positive behavior support to individuals with a variety of delays. The app uses images that show daily events/ routines, or steps needed to complete a specific activity, (i.e. using the restroom) thus increasing independence and lowering anxiety during transitions (Good Karma Applications, 2013).

Apps that were used by occupational therapists during technology enhanced treatment interventions included those that promote fine motor and visual perceptual skills. For example, The Dexterity Family of Apps, by Binary Labs, are a series of apps (*Dexterity*, *LetterReflex*, and

Point of View) that contain exercises for fine motor and handwriting development; letter reversal tasks; and spatial reasoning tasks. Recently Binary Labs released a new app called *Dexteria Jr.* that is specifically intended to facilitate the fine motor development and handwriting readiness of preschoolers. According to the developer, these apps were designed for use in occupational therapy. Another example of an app used during technology enhanced interventions is *Bugs and Buttons* by Little Bit Studio, LLC. This app consists of 18 educational games designed to promote skills such as counting, sorting, sequencing, tracking, problem solving, and fine motor development. *Bugs and Buttons* adjusts to the user's skill level and is just one of a series of educational apps by this developer.

During observations, many students appeared genuinely engaged and excited during treatment interventions involving the iPad[®]. The immediate audio and/ or visual feedback provided when they interacted with the touch screen seemed to be rewarding, and promoted increased vocalizations/ communications for some. Most students knew how to interact with the touch screen with little assistance, but some required increased support. For example, hand-over-hand demonstrations of how to drag items across the screen, or how much pressure to apply were sometimes necessary. Occasionally the audio/ visual feedback presented in some apps was over-stimulating, or the object of perseveration for the occasional student. Students prematurely exiting apps and opening others was infrequently an issue due to the iPads[®] built in guided access feature which is available on devices running iOS 6 and higher. Guided access allows the owner to lock the device into a selected app or disable certain features within an app in order to control how the device is used. Guided access temporarily restricts iOS devices to a particular

app, disables areas of the screen that aren't relevant to a task, or areas where an accidental gesture might cause a distraction (Apple, 2013).

Identify and Discuss Implications for Occupational Therapy

Occupational therapists have always used technology as a tool to increase clients' functional independence. In addition to any assistive technology needs that must always be considered when developing a child's IEP, current educational technologies offer new opportunities for treatment interventions. School therapists can take advantage of these new technologies to help children fulfill their roles as students. Services can be provided directly; via consultation; and/ or through training and development (AOTA, 2013). The information described in the section above points to a need for all three of these service types in regards to technology. Direct services can be provided through technology enhanced interventions and the provision of assistive technologies. Consultative occupational therapy services may include recommending appropriate apps to teachers and parents, and the facilitation of technology-related classroom modifications. Finally, training and development may involve therapists running workshops and programs educating parents on how to use digital devices to support their child's educational performance.

When considering using technology as a tool to help students achieve their goals, it is important to remember that "it can enhance what we do but we should not lose sight of why we use it, is it not a substitute and it is not for everybody" (K. Jacobs, personal communication, February 25, 2013). With its grounding in teaching and learning principles and emphasis on required roles and exploration and mastery, the Role Acquisition Model can provide a framework to help therapists make technology related decisions.

Therapists can use the seven continuums of function and dysfunction outlined in the Role Acquisition Model as part of the assessment process. Each continuum lists a set of items to be observed as well as behaviors that would be indicative of dysfunction for that item. Two continuums relevant to preschool therapy are *school* and *play/ leisure/ recreation*. Items to be observed under the category of *school* are 1) class attendance; 2) classroom behavior; 3) relationship with teachers; 4) relationship with classmates; 5) academic performance; 6) preparation for classes; and 7) participation in academic evaluations (Mosey, 1986, pp. 455-456). Behaviors indicative of dysfunction in regards to classroom behavior, for example, include not paying attention and disturbing other pupils (Mosey, 1986, p. 456). Therapists can then refer to the corresponding postulates regarding change (also outlined in the Role Acquisition Model) for intervention strategies, for example, the therapist may collaborate with the teacher “in developing a plan to alter the student’s behavior so that it is more appropriate to a school situation” (Mosey, 1986, p. 467). Technology enhanced interventions or assistive technologies may prove useful in the process, for example in the current scenario, positive behavior supports may be provided through the use of an iPad® with a reward chart app such as *iEarnedThat*.

By remaining educated and informed about educational technologies, school-based occupational therapists will be able to provide services that reflect the climate of today’s education system as well as undertake emerging roles as trainers and consultants for such technologies.

Advocacy Efforts

Identify Specific Strategies that Will be Used to Address the Issue

In order to advocate for the issues addressed in this paper, the information contained herein will be further edited and synthesized in order to qualify for submission into the *American Journal of Occupational Therapy*. This publication will be formatted in the style of “The Issue Is...” in accordance with *AJOT* guidelines. “The Issue Is...” format addresses timely issues, policies, or trends using cogent arguments from the literature (AOTA, 2012a) and was therefore felt to be an appropriate dissemination route for this advocacy project (see Appendix C for a draft of this advocacy project stylized in “The Issue Is...” format). If the article is not accepted for publication into *AJOT*, other dissemination options will be considered including submission for publication in *OT Practice* or *OT Advance*.

Other strategies that may be used to advocate for occupational therapy’s role in the use of technology in the preschool setting include the following:

- Submitting this advocacy project for a poster or paper presentation at a national or state level occupational therapy conference.
- Formally or informally discussing the issue with fellow OT co-workers, therapists, educators, and parents.
- Formally presenting on the issue to one’s local education board, or state department of education.
- Creating a blog documenting one’s experiences with educational technologies, including technology-based intervention ideas, and advice on devices and apps for therapeutic use.

This will allow a larger and more diverse audience to access information about the issue.

Other web-based approaches include creating an online forum, or a discussion posting on OT connections in order to initiate a discourse on the topic among OT practitioners.

- Teaming up with technology professionals such as app developers and engineers to create technology-enhanced products (hardware and software) that are appropriate for school-based therapy.
- Writing recommendation letters to medical insurance companies justifying a student's need for a particular device and/ or app. For example, an iPad® tablet in conjunction with a speech application could serve as an augmentative alternative communication (AAC) device for a student with a communication disorder. In this case, full or partial coverage under durable medical coverage may be possible.
- Writing or applying for grants to increase access to educational technologies in one's school.
- Participating in or conducting research about the therapeutic use of educational technologies. This will increase the body of knowledge that exists on the subject and can be used to formulate guidelines for evidence-based practice.
- Discussing current and emerging technologies within occupational therapy curriculums. The new educational standards (effect July 31st, 2013) from the Accreditation Council for Occupational Therapy Education (ACOTE®) have already moved in this direction by including an understanding of telehealth technology as a requirement for doctoral, masters, and associate level students. As new technologies such as tablets and mobile devices gain momentum among populations with disabilities (and mainstream society at large), it is hoped that technology-related ACOTE® standards will continue to evolve.

Identify to Whom the Advocacy Efforts Would be Directed

Occupational therapy professionals including practitioners, researchers, educators, advocates, and students are the primary audience for the content discussed in this paper. Therapists working in school-based practice in particular, may find this advocacy topic timely in terms of everyday practice. Readers of *AJOT*, (hence members of AOTA) would have access to the article, while the remaining advocacy efforts would reach out to the wider community of persons/ organizations involved with or affected by the issue. These entities may include education professionals and school-systems, parents of children with special needs, and educational technology professionals/ engineers.

Identify Which Level of Government, Business, Professional Organization, etc. You Would Direct Your Efforts Towards

Refer to the section titled *Identify Specific Strategies that Will be Used to Address the Issue*.

Describe the Funding that Would be Necessary to Carry Out these Advocacy Efforts and Identify Which Sources Would be Available.

While many of the advocacy efforts named earlier would require little to no money to enact, considerable funding may be necessary to increase/ modify/ or update educational technologies in schools. Funding would be needed to purchase the technologies (hardware and software), as well as the technical support staff, training, and physical infrastructure required to support such an endeavor. A salient funding source would be the school district; however, monies could also be raised through parent-teacher organizations and technology-related educational grants. As stated earlier, certain circumstances may qualify a device for coverage

under medical insurance. Other options include parents partially or fully financing devices for their children, or therapists personally financing their own device(s) for therapeutic use.

Expenses associated with dissemination efforts at conferences may include the cost of printed materials, travel, and room and board. Stipends from the host institution, or one's workplace/ educational institution may help to offset some of these costs.

Web-based advocacy efforts could involve fees for creating and up-keeping a website or blog, however many free alternatives exist.

Conclusions

Technological approaches have long been associated with the profession of occupational therapy. Newer devices such as touch screen tablets offer a more interactive, diverse, and portable experience than their predecessors, and are increasingly being used in educational settings as tools for teaching and learning. As members of educational teams occupational therapists can apply these technologies therapeutically to help children fulfill their roles as students. Using a lens such as the Role Acquisition Model to guide our actions, exploration and mastery, and eventual role fulfillment of the student will remain priority. Technology-enhanced interventions will therefore be applied appropriately (among a host of other strategies) and not simply because they exist. With this in mind, therapists may procure new opportunities as educators, trainers, researchers, and developers of these new technologies, thus shaping the course of how they are applied to populations with disabilities. The new ACOTE[®] standard B.1.8 states that students must "Demonstrate an understanding of the use of technology to support performance, participation, and well-being" (ACOTE[®], 2012). Graduates will therefore continue to carry-forward the relationship between occupational therapy and the provision of

technology-based approaches. The author envisions that this advocacy project will generate support and exploration of the issues within.

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Appendix A

Interview Summaries

Summary of Email Interview with Kelly Standerling, M.Ed – 01.18.13

- ***What is the purpose of TPS Preschool?***

>To provide a safe learning environment filled with exploration for all children. To promote and maintain a healthy body and mind which will in turn help children to develop mentally, physically, emotionally, and socially.

- ***What population do you serve at Crossgates?***

Population includes:

>Children ages 3-5 including:

Children at risk

Typical peers

Children with a variety of special needs. Disabilities include developmental delay, autism, medically fragile, and multiple disabilities.

- ***What kinds of programming do you offer?***

>Self-contained classrooms – 1 teacher, 2-3 paraprofessionals, maximum of 8 children with special needs per session.

>Peer classrooms – 1 teacher, 1 paraprofessional, maximum of 12 children per session (8 with special needs, 4 “typically developing” peers).

>2 sessions Monday-Thursday:

AM – 9.00am - 12.15pm

PM – 1.00pm - 3.45pm

>Extended school year services.

- ***What are your funding sources for TPS preschool and any programs offered?***

>ECE grant monies from the state for “typical peers”.

>Special needs funding

>Personal tuition based on sliding scale (peers only).

- ***Are there any unmet programming needs?***

- >Numbers of adequate support staff.
- >Amount/ variety of technology.

- ***What types of technologies are currently being used in the preschool classrooms at Crossgates?***

- >Televisions/ DVD players
- >iPads
- >Computers
- >Headphones/ cassettes
- >*currently looking into/ planning on getting equipment for SMART Boards.

- ***How are advances in technology affecting teaching and learning and school-based therapy at Crossgates?***

- >Technology is an increased support to help facilitate student development and replaces daily expected materials to ensure needs/ wants can be met.

Summary of Email Interview with Tina McDermott, OTR/L - 01.23.13

- ***Overview of the iPad Pilot Program at TPS Preschool***

> Program was created after Tina, Preschool Special Education Supervisor (Kelly Standerling), and Acting Director (Lori Reffert) discussed how they each use the iPad with their own sons (all whom have a diagnosis of Autism).

> All agreed that using iPad technology in the classroom would be beneficial since the preschool serves a large population of children on the Autism spectrum.

> Tina "experimented" using her own personal iPad with various children and found that every one of them responded positively (e.g. children who previously had no interest in fine motor tasks would actually sit and focus for several minutes trying to manipulate the items on her apps). Tina volunteered to "oversee" the pilot program including training staff, running the meetings (with Kelly), providing technology information (apps, iTunes education, accessories, etc.) and assisting the staff in presenting data to TPS for further funding.

> Ten iPads (2nd generation) were purchased, including insurance, and protective screen covers/cases. Any interested staff person was required to summarize how she could use an iPad with her students. Nine staff people (7 teachers/ 2 therapists) were selected and the other iPad is used by Tina.

> Original plan was for Tina to monitor one iTunes account for Preschool and "update" each tablet as necessary, but due to staff being in different buildings, difficulty funding "app" purchases, and various technical issues, it was decided that each teacher or therapist would utilize their own individual iTunes accounts. This way, any apps purchased by the teacher/ therapist would remain in her possession if the iPad was taken away.

> Eight out of the ten participating teachers and therapists own "smart phones" or tablets and were familiar with the use of these objects. The remaining 2 staff members needed minimal training to set up an iTunes account and sync it with their tablet. Tina provides ongoing assistance to "trouble shoot" any issues as they arise. Tina has attended several in-services on the use of tablets as well as seminars focusing on funding and choosing apps to address specific developmental areas. She also sends out emails to keep staff updated on new accessories (styluses, protective cases, etc.), appropriate educational apps, and general iPad information.

> The expectation of the pilot program is two-fold: 1) TPS Preschool wants to "keep up" with the trend to use new technology within the classroom. The Preschool doesn't have updated equipment like the rest of the district. Tablets are versatile in how they can be incorporated into the curriculum. Teachers can use specific apps to address academic goals like identifying

shapes/colors/numbers/letters, present material through videos using music/sign language/mini-movies, use apps with reward/behavior charts, etc. Also, most of the students are "visual" learners and the iPad is one of the best ways to initiate some type of engagement with them. 2) It is hoped that through a presentation of the selected staff's data collection, TPS preschool can prove the effectiveness of this technology and demonstrate progression toward the student's goals.

> Each teacher is responsible for selecting a few students to track over 3 months and then presenting that data in any form she chooses (narrative summary, PowerPoint, video, etc.) with the hopes to acquire funding for more iPads throughout the preschools.

> In Tina's opinion, the biggest impact that the program is having so far is the development of more interaction between peers/special education students. Students love the iPad and will work together in groups to play with it. Kids that usually play by themselves are actively engaging in turn taking and social exchanges with their fellow class mates.

> The benefit of using the iPad is that it is another "tool" for the therapists/ teacher's to utilize. It is not meant to replace play-based learning but it definitely can enhance student skills. It can be used for multiple skill areas. For example, finger isolation/pinch development (popping bubbles/squeezing balloons), visual-motor skills by scanning the screen, sequencing, communication, rewards, etc. The children don't see it as work because it is so fun.

> Tina has not encountered any draw backs to using the iPads. However, there is difficulty finding monies to purchase the apps. The teachers are using their own money (thus the reason to use their own iTunes accounts). Some apps that could be beneficial are expensive....i.e. communication boards like Proloquo2Go are \$189.

> These kids are surrounded by some type of technology (computers, cell phones, game systems, etc.) and as educators, Tina believes that we need to present information and teach in ways they can "relate" too. It needs to be used in conjunction with traditional instruction. This is what makes learning fun, interactive and multi-sensory.

Note: Per Kelly Standerling, M.Ed, Early Childhood Supervisor - funding for the pilot program came from Special Education Student Services, TPS Department. Unmet needs that have emerged in relation to the program include the need for increased technical support, the need for more apps and more devices, and a need for parent in-services on the technology. Positives of the device according to Kelly are that it is small, moveable/ portable, interesting to kids, interactive, touch operated, and updated.

Summary of In-Person Interview with Kimberly Alexander, M.Ed - 01.23.13

- ***Background and career as an Apple Professional***

>Formerly a teacher. Frequently problem solved technical issues with school technologies. Currently works at MacCafé as an Apple Professional. Has expertise in setting up and troubleshooting printers, routers, iCloud, and all Apple devices.

- ***Trainings for schools/ education professionals?***

>MacCafé provides technology training at the district level.

- ***Benefits of using the iPad[®] in schools? What needs can this technology fulfill?***

>Broadness of educational app selection is a plus. Communication apps, academic game apps, and scheduling apps are having a great impact on education.

>Easy to put materials together on an iPad. It is interesting to children – repetition and color helps memory. It is another tactile modality that can facilitate learning.

>iPad can help with integrating varying learning styles.

>Sees particular benefits of device for children with mod-severe communication impairments.

- ***Draw backs?***

>There is a time for the iPad and a time for other activities. Something gets lost with the use of technology. Impeded social interaction may occur – can sometimes be hard to pull children away from the technology.

- ***Effect of iPad on specialized education?***

>Use of icons in apps can make things seem more “normal”.

>More feedback to reinforce learning – can see and hear things.

- ***Unmet needs regarding the use of technology in the school system?***

>The need for app developers to develop educational apps. Developers can fulfill niches as they arise.

Summary of In-person interview with Melanie Criss, OTD, OTR/L – 01.24.13

- ***How did you get into telehealth?***

>Friend who was a virtual school teacher got her thinking about it. Did a literature review and saw the need, lots of evidence for virtual evals/ platforms → developed a program proposal and trialed hybrid handwriting sessions with a few kids.

- ***When is school-based telehealth appropriate and when is it not?***

>Child must be able to 1) sit for extended period of time; 2) be able to follow verbal directions; 3) must be independent with the computer (want child to be as independent as possible). Also children with very involved physical and sensory limitations may not be appropriate candidates.

- ***What are benefits of school-based telehealth in comparison to therapy in a brick and mortar setting?***

>1) Decreased travel time; 2) Easy access to the OT (via email or live lessons); 3) parents can observe the session; 4) therapy is held in the most natural/ comfortable environment for the student; 5) technology increases attention; and 6) decreased cost.

>Disadvantages include lack of hands-on interaction; and audio/ visual difficulties.

- ***How long is each session?***

>30 mins per session, 1x per week.

>Students are K-12, mostly K-5.

>Parents have often previously tried traditional school environment. Parents are very invested, will follow-up with therapist recommendations.

- ***How does reimbursement work? What are the licensure laws?***

>School reimburses for services. Equipment costs \$50-\$100 per child.

>Therapist must be licensed in the state the child lives in. Each state has different rules.

- ***What are AOTA's views on telehealth?***

>It is an alternative intervention option for people in rural areas. AOTA wants therapists to document their telehealth experiences and do research to support this method. Look up AOTA's position paper on telehealth for more information.

- *What are your predictions for the future of school-based telehealth?*

>It will continue to grow. Parents are seeing the benefits and often chose it. It will grow for students in rural areas and is an option for kids in non-rural areas. There will be more advocacy efforts for reciprocity in the licensure laws.

Summary of In-Person Interview with Faith Hairston, MLIS, Manager, Kent Branch Library Access Center, Toledo-Lucas County Public Library; and Jan Connell, MLIS, Children's Librarian, Main Library, Toledo-Lucas County Public Library – 01.30.13

- ***Overview***

>New library center opened November 15, 2011. Received government monies from Broadband Technology Opportunities Program (BTOP) to renovate their public computer center and increase the technologies offered. New library is energy efficient and made Gold in LEED Certification.

>Library manager Faith Hairston believes it is important for people to have access to technology in today's culture; it is relevant to the times. The library can bridge the divide in access to technology because it is free. We are all affected directly or indirectly by technology and it can help to enhance our lives. Programming at the center has been well received. The center has made people in the community more comfortable with technology and helped people to prepare for the job market. Students are given the skills to look up print materials and research online resources independently.

- ***Preschool Programming***

>Programs aimed at Preschoolers began last spring and include Preschool Story Time - this is an interactive story time program that uses online resources, SMART Boards, and Google Docs presentations to tell stories in an engaging way. The more interactive the presentations (the more web 2.0 features that are embedded) the more the preschoolers enjoy it. A second program is Every Child Ready to Read[®] – this is a national program designed to help young children develop the skills they need in preparation for learning how to read. In this program parents and caregivers are educated on how to support the early literacy development of their children.

>Through access to technology preschoolers can seek cause and effect and they can be autonomous. Technology allows them to actively make things happen. The earlier you start the more successful they will be with technology down the road. Programming for preschoolers should also involve both print literacy and information literacy.

- ***General Programming***

>Services provided include computer classes (beginner's level). These classes teach computer skills one would need for entry-level employment e.g. managing email accounts, word processing, creating resumes, how to do a job search, basic internet search etc. Also provide

education on reliability of various websites. Many participants are older adults. Classes are free and hold up to 12 people.

- ***Accessibility***

>Technology accessibility features include wheelchair accessible computers every computer station. Enlarged keyboards, headphones, ability to zoom text. Computers with specialty software for people with hearing or visual impairment e.g. Dragon[®] Dictation* and SARA^{®**}

**Dragon Dictation is a voice recognition program that can turn speech into text (see www.nuance.com).*

*** SARA (Scanning and Reading Appliance) is a scanner that recognizes text on printed materials, translates it into speech, and then reads it out loud (see www.freedomscientific.com).*

Summary of Phone Interview with Thomas Smet, App Developer - 02.03.13

- Saw a gap with good educational apps for idevices. Observed a child playing a game on the iPhone but noted that the child didn't fully understand how to play the game so thought it would be a good idea to make apps geared towards children.
- Apps can offer new age version of things we had as children, e.g. Sesame Street, but apps can be more interactive.
- Created an app called Holly the Hippo (in beta test phase) for 2-5 year olds, drag shapes, letters, numbers, and colors into hungry hippos mouth – self-contained experience (don't need internet connection).
- Created a second app called Tasha'sWorld - shapes, colors, numbers, letters, counting, must match words to images. Kids can select an avatar and which activities to do.
- Apps must be something children can enjoy and play with for a while, need to take short attention into account.
- Thoughts on Apple idevices: Apple has a large market share and ecosystem that attracts app developers. Lots of opportunities for recognition. There is a difference in how Apple and Android customers use their devices. Developers often approach Apple first and then go after alternatives.
- Would be open to collaborating with early education professionals to produce apps, wants to be genuine. Too many "junky" apps out there.
- Touch screens are a natural way to interact with things, feel like you are participating directly with the technology. Mouse/ cursor usage is a disconnected experience.

Summary of Phone Interview with Jana Cason, DHS, OTR/L - 02.04.13

- AOTA's Technology Special Interest Section primarily deals with traditional AT.
- Jana has pushed telehealth, is a proponent of it. We can expect to see tremendous growth in this area.
- Described 3 arms of technology in OT:
 - > Assistive technology
 - > Telehealth
 - > Technology enhanced interventions
- We must remember that technology is not the intervention, it is a tool.

Summary of Email interview with Kimberly Blunt, M.S., CCC/SLP - 02.11.13

- Has been using the iPad for a few months during school-based speech therapy sessions (middle school and high school).
- Uses iPad device with cognitively impaired students (middle – high school) as an AAC device or picture displayer.
- iPad has positively affected treatment outcomes. The students always take to technology.
- Has not experienced challenges incorporating iPad technology into treatment.
- Believes modern changes in technology are helping tremendously in the delivery of speech therapy services. In this new day and age, the students understand technology and gravitate towards it making therapy a lot easier and more fun.

Summary of Email Interview with Kelly Van Singel, iTaalk Educator – 02.13.13

- ***Impacts access to iPad technology has had on the children, parents, and families you have worked with.***

>We have been using iPad since August 2010. Because the iPad is so multisensory and accessible for users of any ability, it's a game changer. It is convenient and easy to transport. It can be used for almost any reading, writing, learning, or communication task. It can also be used for leisure.

- ***Qualities/ features that make the iPad device so effective for the population that iTaalk serves?***

>It is more affordable than other AAC devices. Apps are relatively low in cost (with the exception of some AAC and special education apps). It is effective for families and individuals living with Autism because it is so accessible. It is responsive and consistently responsive.

Summary of Phone Interview with Karen Jacobs, Ed.D., OTR/L - 02.25.13

- Research interests: interested in how children use technology (computers, notebooks, iPads).
- Became interested in technology and ergonomics while volunteering at her children's middle school. Saw the awkward posture of the kids, glare in computer class, musculoskeletal discomfort. Came into school and talked about how to make ergonomic changes. Volunteering at the school developed into research project.
- Currently studying healthy 6th graders in math class who use iPads. Looking to see effects on vision, aches, pains, musculoskeletal discomfort. Provides ergonomic training. Also looking at effects of flipped learning approach. Predicts that iPad will engage students in learning, participating in ergonomic training will decrease musculoskeletal discomfort, and academic performance will be enhanced through flipped learning approach.
- Involved in tele-ergonomics. Evaluates computer work systems remotely via telehealth platform. Uses Technology to teach online OTD Program.
- Views on future of telehealth: It is exploding, will see growth in this area. It is portable between states. Portable Care Act has telehealth written into it.
- Views on technology enhanced interventions: technology is a tool to help achieve our goals e.g. help students engage in learning. Not a substitute. Not for everybody. It can enhance what we do but we should not lose sight of why we use it.

Technology Observations at Beverly K-8 School with Christine Coleman, M.Ed - 02.26.13

- ***Overall Building Technology:***

- >Two computer labs in building, headphones available for each computer station.
- >Teachers are given fobs that hold their school account information. These fobs can be connected with any photocopier in the district allowing educators to print from their account anywhere in the district.
- >TV's in most hallways.
- >Morning announcements are projected onto classroom SMART Boards.

- ***Classroom Technology:***

- >All classrooms are equipped with either a SMART Board system (computer, interactive whiteboard, and projector) or MimioTeach™ interactive whiteboard* system, along with 4 desktop computers, and a document camera.
- >A few personally owned iPads are used in some classrooms.
- >All teachers have clip on microphones so that hearing impaired students can hear better through their hearing devices.

- ***Funding:***

- >Parent-teacher organization raised much of the money used to fund these educational technologies.

**MimioTeach™ interactive whiteboard systems turn standard dry erase whiteboards into an interactive system. The Mimio Teach system involves a MimioTeach bar that can be placed anywhere on the left side of an ordinary whiteboard; a MimioHub receiver that plugs into a USB port on your computer; and a standard projector that is connected to a computer (see www.mimio.com).*

Technology Observations at Arlington K-8 School with Kristin Haney, M.Ed - 02.27.13

- ***Overall Building Technology:***

>Temporary computer lab with laptops currently being used (headphones for each station).

>Teachers are given fobs that hold their school account information. These fobs can be connected with any photocopier in the district allowing educators to print anywhere from their account. 5 fob based copiers in the school.

>Wi-Fi throughout building.

- ***Classroom Technology:***

>All classrooms are equipped with a SMART Board system (computer, interactive whiteboard and projector), along with 4 desktop computers (and headphones). Every classroom is hooked up with surround sound.

>Only monitors and keyboards are placed on desk, can lock computer towers away at night.

>All teachers have clip on microphones so that hearing impaired students can hear better through their hearing devices. Teachers have separate microphone for hearing impaired students.

>All classrooms have DVD/ VHS players.

>1 document camera per grade level.

>1 Airliner Wireless Slate* system per grade level.

- ***Computer Programs***

>A program called STAR** is used for reading and math assessments. Used at the end of each quarter.

>A program called Success Maker*** which tests reading and math is used every day for 30-35 minutes per child.

- ***Funding:***

>Parent-teacher organization raised much of the money used to fund these educational technologies.

Note: The school will be piloting an iPad program for 4th grade next year.

**The SMART Airliner Wireless Slate system includes a slate, pen, and wireless mouse. It allows teachers to interact with the SMART Board (including writing, clicking, and dragging) from a distance, and gives students the opportunity to interact with the SMART Board from their seats (see www.smarttech.com).*

*** STAR Enterprise Assessments by Renaissance Learning “dynamically adjust to each student’s unique responses, pinpointing student achievement levels quickly and efficiently” (see www.renlearn.com).*

**** SuccessMaker[®] by Pearson Education, Inc “provides a digitally driven reading and math learning experience that is singularly focused on the needs of each individual student for instruction that is truly and automatically differentiated” (see www.pearsonschool.com).*

Summary of Phone Interview with Dennis Cleary, OTD, OTR/L - 03.05.13

- ***Current Projects***

>Works with adolescents with DD who are transitioning (18-25 year olds who have left school). iPads are used for scheduling, reminders, training, video modeling, and photos. Project Search: Funded by US Department of Education, \$2.5 million grant. Summer program: Funded by Ohio Rehabilitation Services Commission.

>Believes that students should own their own devices therefore they can keep them after graduation. If provided by the school then students will no longer have device when they transition.

- ***Benefits of using iPad***

>Temple Grandin cursor theory (iPad cuts out the middle man, deal directly with the picture/ icon using your hand). iPad is intuitive, it acts how you think it should. Cheaper, more likely to go home, people aren't afraid of it but might not be right for everyone.

> See rubric geared towards using iPad on blog (otwithanipad.blogspot.com).

Summary of In-Person Interview with Mathew Daniels, Faculty Technology Coordinator, English Faculty, St. John's Jesuit High School & Academy – 03.06.13

- St. Johns began a device for every learner initiative in Spring 2011 with the iPad 2. Parents pay for the devices over 3 year period, price includes the cost of apps. Building was reconfigured in order to accommodate several devices. Each student has own iTunes account and all are managed through JAMF Software, LLC. This allows devices to be tracked and staff can “push” educational content, announcements, emails etc. out to all devices. School buys required apps in bulk (with educational discount) and then distributes them in order to make sure every student has the correct apps. School facilitates repair and maintenance of devices. School has a loaner program for those temporarily without a device. Students get to keep devices after graduation; this is a “freer” design and allows students to become responsible users. Mr. Daniels enables teachers to be better with the iPad; holds weekly professional development sessions on ways to use the iPad in education.
- Students learn how to use the devices in class. Teacher provides education on how to use the apps. Apps used by students include *Keynote* (for creating presentations) and *Pages* (for word processing). Wi-Fi is available throughout building to access online materials. Students tend to be “app savvy”.
- According to Michele Nixon, M.Ed, Learning Specialist at St John's Jesuit High School & Academy, the iPad is leveling the playing field for students with special needs. Apps such as Dragon Dictation have eliminated the need for a scribe (cuts out the middle person); the firefly K3000 app can turn written books into audio books and students can then wear headphones to listen. The iPads are portable and make the student an independent learner. Graphic books and YouTube videos are useful for students with low language skills or ESL learners. Apps can be used to help students with time management and organization. Students can create their own content which provides a different approach to learning and changes their understanding.

Appendix B

Parent Technology Survey

The purpose of this anonymous survey is to gather parent perspectives about the use of technology (e.g. computers, laptops, iPads, DVDs, CDs, smartphones) by themselves and their preschoolers. Please circle the best response.

- *I own a home computer or tablet (e.g. iPad, Kindle Fire, Nook).* **n = 68**

Yes.....**160 (95.2%)**

No.....**8 (4.8%)**

- *I have home Internet access.* **n = 68**

Yes.....**157 (93.5%)**

No.....**11 (6.5%)**

- *I have good computer skills.* **n = 68**

Strongly agree.....**27 (39.7%)**

Agree.....**25 (36.8%)**

Somewhat agree.....**7 (10.3%)**

Neutral.....**6 (8.8%)**

Somewhat disagree.....**1 (1.5%)**

Disagree.....**2 (2.9%)**

Strongly disagree.....**0 (0.0%)**

- *Technology should be used as a tool to teach children.* **n = 68**

Strongly agree.....**28 (41.2%)**

Agree.....**31 (45.6%)**

Somewhat agree.....**7 (10.3%)**

Neutral.....**2 (2.9%)**

Somewhat disagree.....**0 (0.0%)**

Disagree.....**0 (0.0%)**

Strongly disagree.....**0 (0.0%)**

- *I believe educational technologies should be funded within the schools. n = 68*

Strongly agree.....**26 (38.2%)**
 Agree**29 (42.6%)**
 Somewhat agree.....**9 (13.2%)**
 Neutral.....**4 (5.9%)**
 Somewhat disagree.....**0 (0.0%)**
 Disagree.....**0 (0.0%)**
 Strongly disagree.....**0 (0.0%)**

- *My child plays games on a home computer or tablet. n = 68*

Strongly agree.....**24 (35.3%)**
 Agree.....**24 (35.3%)**
 Somewhat agree.....**6 (8.8%)**
 Neutral.....**5 (7.4%)**
 Somewhat disagree.....**1 (1.5%)**
 Disagree.....**5 (7.4%)**
 Strongly disagree.....**3 (4.4%)**

- *I would be interested in technology training classes for parents at the school. n = 68*

Strongly agree.....**15 (22.1%)**
 Agree.....**21 (30.9%)**
 Somewhat agree.....**6 (8.8%)**
 Neutral.....**18 (26.5%)**
 Somewhat disagree.....**3 (4.4%)**
 Disagree.....**2 (2.9%)**
 Strongly disagree.....**3 (4.4%)**

Appendix C

Draft of “The Issue Is...”

The Issue Is...

Use of Technology in the Preschool Setting: Advocating the Role of Occupational Therapy

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Key words: role, technology, schools, advocacy

The Issue Is...Use of Technology in the Preschool Setting: Advocating the Role of Occupational Therapy

Modern technology has become a routine part of the lives of individuals with and without disabilities, as well as society as a whole. According to the Assistive Technology Act of 2004:

Technology is one of the primary engines for economic activity, education, and innovation in the Nation, and throughout the world. The commitment of the United States to the development and utilization of technology is one of the main factors underlying the strength and vibrancy of the economy of the United States.

The profession of occupational therapy has always been committed to the development and utilization of technology (Hammel & Angelo, 1996; Smith, 1991; Trefler, 1987; Vanderheiden, 1987). According to Smith (1991), “Before the current age of computers, therapists applied handmade technology which was often constructed in their own clinic workshops” (p. 750). This paper will advocate for occupational therapy’s role in implementing technology as a tool to assist preschoolers in developing educationally related skills. It is hoped that this endeavor will both strengthen the role of preschool-based occupational therapy, and highlight the profession as one that is able to evolve with and influence the technological advancements that affect occupational therapy practice.

Technology

The American Occupational Therapy Association (AOTA) defines technology as “The combination of assistive, basic, complex, electronic and information, and rehabilitative and educational technologies” (2010c). While each of these areas can be defined in their own right, this paper primarily refers to rehabilitative and educational technologies as well as assistive

technologies. Rehabilitative and educational technologies are modalities used as part of an overall education or rehabilitation plan where they serve as "...tool[s] for remediation or rehabilitation" (Cook & Polgar, 2008, p.5). An assistive technology device 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). This paper will demonstrate how recent technological inventions, such as the iPad[®]; a touch screen tablet computer designed and marketed by Apple, Inc., have the capacity to be used as rehabilitative and educational, or assistive technology devices within the preschool setting.

Technology in Occupational Therapy

At present, there are three major arms of technology within the profession of occupational therapy – 1) assistive technology, 2) telehealth, and 3) technology enhanced interventions (J. Cason, personal communication, February 4, 2013). Assistive technology (as described above) is a familiar term in occupational therapy. Technology enhanced interventions meanwhile, are frequently carried out by therapists but may not be described using this name. For example, the terms rehabilitative and/ or educational technologies (defined above) may be used. In this paper, the term technology enhanced interventions will be used to describe school-based treatment interventions involving the use of educational technologies.

Telehealth is an emerging area both within the field of occupational therapy and healthcare in general; involving "...the application of evaluative, consultative, preventative, and therapeutic services delivered through telecommunication and information technologies" (AOTA, 2012b). This model of healthcare delivery allows services to be provided without both

parties having to be physically present at the same location (AOTA, 2012b). Although telehealth is not the cardinal branch of technology considered in this paper, a discussion of technology in occupational therapy would be incomplete without recognizing this emerging model.

Occupational therapy services currently being provided via telehealth include school-based services and ergonomic training (tele-ergonomics). Melanie Criss, OTD, OTR/L, the owner of Community Therapy Services, a company that provides school-based therapy services to children attending virtual school, believes that these services will grow significantly for students in rural areas (personal communication, January 24, 2013).

Factors That Affect the Issue

In addition to the federal laws (e.g. Individuals With Disabilities Education Improvement Act, 2004) which mandate the provision of special education and assistive technology in the United States, there are many systems that affect the issue of technology use in schools.

Culturally, the technological advancements of society as a whole affect the issue of technology use among students with disabilities. According to the Assistive Technology Act of 2004, “Any development in mainstream technology will have profound implications for individuals with disabilities in the United States”. One such example has been the introduction of the Apple iPad[®], which was first released in 2010. This device, along with subsequent iterations, has experienced considerable mainstream success and is now being utilized in education and therapy clinics nationwide. Interested parties may visit Apple’s website to access numerous resources dedicated to iPad[®] in special and regular education. Another cultural factor affecting the issue is the attitude of school personnel towards educational technologies. As stated by Bitner and Bitner (2002), “Before technology can effect changes in the classroom,

those ultimately responsible for the classroom must be considered. Teachers must learn to use technology and must allow it to change their present teaching paradigm” (p. 95). In a similar manner, school therapist’s attitudes can influence the adoption and utilization of technology enhanced treatment interventions.

Lastly, practical matters such as funding and technical support for the adoption of technology in schools inevitably affect the issue. In the current time of sequestration, funding may be particularly challenging. Based on an analysis by the Center on Budget and Policy Priorities, the National Education Association (NEA) predicted that Federal Education Programs would be cut by \$3 billion dollars as a result of the sequester. In the state of Ohio, Preschool Grants would be reduced by \$626,000, while Special Education Grants to States would be reduced by over \$22 million (NEA, 2013).

Role Acquisition Model

According to AOTA, school-based occupational therapy practitioners “...use their unique expertise to help children to prepare for and perform important learning and school-related activities and to fulfill their role as students” (2010b). The Role Acquisition Model, (Mosey, 1986, Chapter 26), with its emphasis on teaching and learning principles (the therapist is analogous to a teacher, while the client is viewed as a learner), provides an appropriate lens to analyze how technology can be used to facilitate these educational outcomes and therefore children’s roles as students. In preschool settings in particular:

Practitioners support the achievement of developmental and learning outcomes for children by facilitating social skills development, motor development, self-regulatory skills, emergent literacy, and the development of adaptive and self-care skills.

Occupational therapists are particularly skilled in helping children access curricular activities by contributing to the design and planning of activities, including identifying any needed accommodations or modifications (AOTA, 2010a).

Play is one of a child's major occupations and the primary means by which the above developmental and learning outcomes are both facilitated and accomplished in the preschool setting (AOTA, 2011). In fact, "Through exploration of the environment and spontaneous engagement in meaningful activity, children develop social, emotional, cognitive and physical skills that provide the foundation for later role expectations" (Haertl, 2010, p. 278). This compliments one of the central tenets of the Role Acquisition Model – to encourage the client to experience both exploration and mastery through the development of skills that make roles possible: task skills and interpersonal skills (Mosey, 1986, p. 451). Task skills involve the ability to manipulate the non-human environment, and interpersonal skills involve one's behavior in relationship to others. Another key aspect of the model is that of temporal adaptation (or time management). Temporal adaptation dictates that in order to be successful, the client must be able to organize and balance their roles in a healthy way.

According to the Role Acquisition Model, learning of roles takes place from both a sociological perspective (a socialization process) and a psychological perspective. Socialization describes how roles are acquired, whereas the psychological dimension describes the learning process (Mosey, 1986, p. 451). The three elements of the socialization process are: 1) the person learning the role, 2) the agent (who is responsible for what is to be learned), and 3) the setting in which learning takes place. The psychological process involves 16 principles of learning that

describe how factors such as student motivation, attention, active participation, reinforcement, repetition, and the environment affect the learning process.

Overview

Preschool play occupations include imaginative or pretend play, manipulative play, and sensory-rich play e.g. blocks, stacking rings, shape sorters, push and pull toys, balls, books, sand, water, large beads, movement games, toy cars/trucks, train sets, and musical toys (AOTA, 2012a). Technology has long been used as a tool to increase participation in these important play-based occupations for children with varying special needs. Occupational therapists may employ low-technology solutions such as modifying seating positions, applying Dycem[®] and lap tables to hold toys, and using enlarged toys and game pieces; and/ or high-technology solutions such as computers and augmentative communication systems, mobility devices, and modified sports equipment (Haertl, 2010, p. 294). When technology is used to help support functional independence in this manner it is referred to as assistive technology - this is how technology has been traditionally applied in the school setting. According to Smith (1991) however, in addition to helping, technology has a second major role: teaching. Technologies that help to teach are referred to as rehabilitative or educational technologies (defined above). In comparison to assistive technologies that help the client to perform a function, rehabilitative or educational technologies facilitate progressive skill development (Smith, 1991). With the variety of rehabilitative/ educational technologies available in today's market there are growing opportunities for occupational therapists to incorporate technology enhanced treatment interventions into practice. These interventions would not replace imaginative/pretend,

manipulative, and sensory-rich play but would be used alongside these approaches as yet another tool in the therapist's proverbial "bag-of-tricks".

Inquiry into the Use of Technology in Preschool

An exploration into the use of technology in preschool was carried out at a public preschool in the Northwest Ohio region during Spring 2013. Information from therapists, teachers, students, and parents was gathered via observations, personal interactions, semi-structured interviews, and/ or questionnaires in order to gather a working knowledge on the subject. In the of Fall 2012 the preschool adopted an iPad[®] pilot program in which a group of therapists and teachers were selected to received iPads[®] for classroom/ therapeutic use. The pilot program was still underway at the time of this exploration.

School Therapists

Questionnaires regarding the use of technology in preschool therapy were administered to four preschool therapists (1 occupational therapist and 3 speech therapists). All four used the iPad[®] in therapy either every day or several times per week. Three of the four therapists used it with more than 20 students per week while one used it with 6-9 students per week. Therapeutic uses for the device included fine motor/ visual perceptual development; receptive/ expressive language development; cognition; attention; social skills development; communication board; and visual scheduling. All agreed they would like to use the iPad[®] more frequently in treatment. Other technologies therapists reported using were Leapfrog[®] educational products and VTech[®] educational products. Both Leapfrog[®] and VTech[®] produce technology-based educational products and content for children ages birth to approximately 8-9 years old. Their products include touch screen learning tablets and apps, as well as manipulative toys. Low technology

products used by therapists included classroom materials (e.g. toys, blocks, crafts), and picture card flip books with stimulus words. When asked to state the benefits of using the iPad® device, therapists commented on its ability to engage/ interest students, provide immediate cause and effect, and encourage learning through seeing/ doing via the visual-tactile interface. They also remarked on the convenience of storing multiple materials in once place, user-friendliness of the device, and the reduced set-up involved - leaving more time to work with/ observe the students. Limitations included some students becoming over excited/ perseverative over the device, students switching between apps, and not wanting to try other things. A lack of resources to buy apps, limited technical support, and resistance from traditional teachers was also mentioned.

Overall, feedback from therapists suggests that iPad® is being used successfully with multiple students to work on a diverse range of skills in this particular preschool setting. Therapists point to the many options/ materials afforded when using the device as well as the level of student engagement garnered. Responses also point to the clinical judgment and decision making skills required in determining how best to apply iPad® technology to the child's needs; it may be that the device is not appropriate or therapeutic for every child. Also funding, technical issues, and attitudes towards technology are factors that can affect the success of technology related interventions.

Special Education Teachers

Preschool special education teachers were also asked about their use of classroom technology via a questionnaire. The two most common types of technology being used were personal computers and audio players (CD, tape player, or MP3). Televisions, laptops, and iPads® were used to a lesser extent. There were also four teachers who reported using one of the

following: smart phone, digital camera, record player, and scanner. When asked which additional technologies would more fully address their teaching needs, most teachers selected SMART Boards, followed by iPad®s. Common obstacles to integrating technology into the classroom were felt to be a lack of funding, training, and technical support, as well as malfunctioning equipment and/or software; these obstacles are similar to those stated by therapists in the paragraph above. Group trainings and peer demonstrations were the most frequently identified supports that would help teachers to use technology more effectively in their classrooms, followed by one-on-one sessions. As for when teachers would most likely attend a technology workshop/ training session, answers varied from during summer break to during the school day.

As therapists are often guests in the classroom, it is important for them to know what types of educational technologies are available and being used in the classroom environment. This may be the only time therapists have access to certain technologies (e.g. SMART Boards) for intervention and hence utilize them to support the needs of all students, with and without disabilities. Therapists may collaborate with teachers, for example, in the development of technology enhanced handwriting or social skills interventions for the entire class. They may also implement universal design for learning principles (UDL) through the use of technology. UDL is “a set of principles for curriculum development that give all individuals equal opportunities to learn” (CAST, 2012b). According to CAST (2012a) “powerful digital technologies applied using UDL principles enable easier and more effective customization of curricula for learners.” For example, technology may be used as a tool to implement the first principle of UDL, which is to provide learners with multiple means of representation. UDL

concepts are consistent with the Role Acquisition Model, which identifies the environment as critical in the learning process (Principle 13).

Parents

In order to investigate the issue further, surveys were administered to a convenient sample of 123 parents of preschoolers receiving special education services. The survey was designed to gather information about parents' use of technology and their attitudes towards technology. Sixty-eight parents (55%) responded over a three-week period and response frequencies were calculated. Over 95% of parents reported owning a home computer or tablet, while more than 93% reported having internet access. A majority of parents (76.5%) believed that they had good computer skills and 70.6% reported having a child that plays games on a home computer or tablet. Most parents believed that technology should be used as a tool to teach children (86.8%) and that educational technology should be funded within the schools (80.8%). When asked if they would be interested in technology training classes, 53% of parents either agreed or strongly agreed. Responses suggest that computer/ tablet technology and internet access are available in many homes and parents tend to be savvy in basic computer skills. Many parents are supportive of the funding and use of educational technologies as teaching methods, and allow their children to use technology at home. A notable portion of parents also indicated they would like to learn (or learn more) about technology.

The above parent survey data can be used to promote collaboration between parents, therapists, and teachers in regards to preschoolers' learning through educational technologies. Principle 16 of the Role Acquisition Model pinpoints the need for continuity "between the learning situation and the experience for which the learning constitutes preparation" (Mosey,

1986, pp. 451-452). Occupational therapists can therefore have a role in recommending appropriate apps/ computer games/ programs to parents in order to support continuity between learning at home, and the technology enhanced interventions being used at school. Therapists can also train parents on how to operate these apps/ programs and the devices on which they run (e.g. iPad® tablets). Again, the purpose would not be to promote learning solely via technology, but to include technology as one option among a variety of intervention tools and approaches (e.g. imaginative/ pretend, manipulative, and sensory-rich play). On the survey a handful of parents expressed concern over this issue and the amount of screen time their preschoolers encounter. In contrast, one parent commented on how much their child has learned via tablet technology. Opinions vary on the issue of screen time and a number of resources exist for parents and professionals interested in the topic. The American Academy of Pediatrics (AAP) and The Center on Media and Child Health (CMCH) at Children's Hospital Boston, for example, both provide information, tips, and guidelines for responsible screen time management. Lisa Guernsey, a parent and technology and education journalist also sheds light on the issue in her book *Screen Time: How Electronic Media – From Baby Videos to Educational Software – Affects Your Young Child*.

Preschool Students

In order to gain a first-hand perspective of the preschool iPad® pilot program, numerous observations of (and interactions with) students using the technology were carried out. The iPads® were incorporated as one of several intervention tools utilized by therapists and teachers in the delivery of preschool special educational services. Students used the devices in a structured environment under the supervision of a therapist or teacher in either a one-to-one or

small group setting. Therapists and teachers were autonomous in how they chose to use the devices as long as it was in accordance with the student(s) IEP goals. A combination of third party applications and built in features of the iPad® devices were used. Built in features that were used include the ability to upload videos, photos, and music directly to the device; third party applications varied depending on the needs of the child.

In occupational therapy, the iPad® was used both as an assistive technology device and as a tool for technology enhanced interventions. Examples of assistive technology applications include *Answers: Yes/No HD* by Simplified Touch. This app allows the iPad® to be used as a switch so that users can make a choice between simple yes/ no or this/ that questions by touching the corresponding word or image. The app is marketed towards individuals with communication disorders and was originally designed to “provide an easy to use, affordable way for a nonverbal young man with autism and motor planning issues to communicate with those around him (Simplified Touch, 2013). *iEarnedThat* by Kidoc, LLC is another assistive technology application that allows the iPad® to be used as a reward chart. The app was designed by a pediatrician and a parent as a motivational tool to help children develop desirable behaviors by working towards tangible goals (Kidoc, 2013). A picture of a desired goal is turned into a 3D puzzle that children can work towards one puzzle piece at a time. A final example of an assistive technology application is *First Then Visual Schedule* by Good Karma Applications, Inc. This app was designed for caregivers to provide positive behavior support to individuals with a variety of delays. The app uses images that show daily events/ routines, or steps needed to complete a specific activity, (i.e. using the restroom) thus increasing independence and lowering anxiety during transitions (Good Karma Applications, 2013).

Apps that were used by occupational therapists during technology enhanced treatment interventions included those that promote fine motor and visual perceptual skills. For example, The Dexterity Family of Apps, by Binary Labs, are a series of apps (*Dexterity*, *LetterReflex*, and *Point of View*) that contain exercises for fine motor and handwriting development; letter reversal tasks; and spatial reasoning tasks. Recently Binary Labs released a new app called *Dexterity Jr.* that is specifically aimed at fine motor development and handwriting readiness in preschoolers. According to the developer, these apps were designed for use in occupational therapy. Another example of an app used during technology enhanced interventions is *Bugs and Buttons* by Little Bit Studio, LLC. This app consists of 18 educational games designed to promote skills such as counting, sorting, sequencing, tracking, problem solving, and fine motor development. *Bugs and Buttons* adjusts to the users skill level and is just one of a series of educational apps by this developer.

During observations, many students appeared genuinely engaged and excited during treatment interventions involving the iPad[®]. The immediate audio and/ or visual feedback provided when they interacted with the touch screen seemed to be rewarding, and promoted increased vocalizations/ communications for some. Most students knew how to interact with the touch screen with little assistance, but some required increased support. For example, hand-over-hand demonstrations of how to drag items across the screen, or how much pressure to apply were sometimes necessary. Occasionally the audio/ visual feedback presented in some apps was over-stimulating or the object of perseveration for the occasional student. Students exiting apps and opening others was infrequently an issue due to the iPads[®] built in guided access feature that is available on devices running iOS 6 and higher. Guided access allows the owner to lock the

device into a selected app or disable certain features within an app in order to control how the device is used. Guided access temporarily restricts iOS devices to a particular app, disables areas of the screen that aren't relevant to a task, or areas where an accidental gesture might cause a distraction (Apple, 2013).

Implications for Occupational Therapy

Occupational therapists have always used technology as a tool to increase clients' functional independence. In addition to any assistive technology needs that must always be considered when developing a child's IEP, current educational technologies offer new opportunities for treatment interventions. School therapists can take advantage of these new technologies to help children fulfill their roles as students. Services can be provided directly; via consultation; and/ or through training and development (AOTA, 2013). The information described in the section above points to a need for all three of these service types in regards to educational technology. Direct services can be provided through technology enhanced interventions and the provision of assistive technologies. Consultative occupational therapy services may include recommending appropriate apps to teachers and parents, and the facilitation of technology related classroom modifications. Finally, training and development may involve therapists running workshops and programs educating parents on how to use digital devices to support their child's educational performance.

When considering using technology as a tool to help students achieve their goals, it is important to remember that "it can enhance what we do but we should not lose sight of why we use it, is it not a substitute and it is not for everybody" (K. Jacobs, personal communication, February 25, 2013). With its grounding in teaching and learning principles and emphasis on

required roles and exploration and mastery, the Role Acquisition Model can provide a framework to help therapists make sound technology related decisions.

By remaining educated and informed about educational technologies, school-based occupational therapists will be able to provide services that reflect the climate of today's education system as well as undertake emerging roles as trainers and consultants for such technologies.

Conclusions

Technological approaches have long been associated with the profession of occupational therapy. Newer devices such as touch screen tablets offer a more interactive, diverse, and portable experience than their predecessors, and are increasingly being used in educational settings as a tool for teaching and learning. As members of educational teams occupational therapists can apply these technologies therapeutically to help children fulfill their roles as students. Using a lens such as the Role Acquisition Model to guide our actions, exploration and mastery, and eventual role fulfillment of the student will remain priority. Technology-enhanced interventions will therefore be applied appropriately (among a host of other strategies) and not simply because they exist. With this in mind, therapists may procure new opportunities as educators, trainers, researchers, and developers of these new technologies, thus shaping the course of how they are applied to populations with disabilities. The new ACOTE[®] standard B.1.8 states that students must “Demonstrate an understanding of the use of technology to support performance, participation, and well-being” (ACOTE[®], 2012). Graduates will therefore continue to carry-forward the relationship between occupational therapy and the provision of technology-based approaches.

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