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Assistive Technology and the Impact of Occupations

Chelsea Golding *Dominican University of California*

Chantelle Bond *Dominican University of California*

Vhernna Fernandez *Dominican University of California*

Eizelle Barrientos *Dominican University of California*

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This thesis, written under the direction of the candidate's thesis advisor and approved by the program chair, has been presented to and accepted by the Department of Occupational Therapy in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy.

Chelsea Golding, Chantelle Bond, Vhernna Fernandez, and Eizelle Barrientos
Candidate

Julia Wilbarger, PhD, OTR/L
Program Chair

Laura Greiss Hess, PhD, OTR/L
First Reader

Assistive Technology and the Impact on Occupations

by

Eizelle Barrientos, Chantelle Bond, Vhernna Fernandez & Chelsea Golding

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Abstract

Objective: The purpose of this research was to empirically examine the occupational impact of assistive technology - AT (with a specific focus on word prediction, text to speech and speech recognition) from the perspectives of the end user, family and school personnel (e.g. teachers, therapists & specialists) across various contexts (e.g. home, school, community).

Method: Qualitative data included semi-structured interviews, audio and video recordings, and records reviews. The data was coded and analyzed using a constant comparison method to identify themes pertaining to the occupational use of AT and thusly the impact to overall occupational performance.

Findings: Six themes were identified: people, match, features, context, facilitators and barriers. Each theme was central to implementation of AT and occupational performance. We additionally found that there was a lack of occupational therapy (OT) involvement in the interdisciplinary AT team.

Discussion: AT has a positive impact on occupational performance and quality of life for the end user and family across contexts. Facilitators and barriers to AT were present within each prominent theme. We have proposed a theoretical model encapsulating how AT supports occupational performance. We further assert that there is a role for OT as an active member on the interdisciplinary AT team when considering the occupational impact of AT.

Keywords: Occupational Therapy, Assistive Technology, Text to Speech, Word Prediction, Speech Recognition, Occupation Centered, Written Expression, Qualitative Methods, Communication, Spinal Muscle Atrophy, Cerebral Palsy, PEO.

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Literature Review

Introduction

Occupational therapists (OTs) employ Assistive Technology (AT) strategies and applications to promote engagement in meaningful occupations (AOTA, 2015). Technology and environmental interventions can support peoples' participation in occupations. Occupations by definition hold purpose and meaning for individuals, which include activities of daily living (ADLs), instrumental activities of daily living (IADLs), education, play, work, leisure, and social participation. The holistic perspective of OTs address what individuals value and how well they are able to accomplish a selected action or activity of their meaningful occupation, which is known as occupational performance (AOTA, 2014). OTs unique role analyzes an individual's occupational performance by understanding their strengths and the barriers in their environment. Once these strengths and barriers are identified, OTs educate and help individuals learn new skills through adaptation and modifications to engage in their occupations. AT is one way OTs can overcome barriers that individuals may face across various contexts and falls within the occupational therapy (OT) scope of practice (AOTA, 2015).

Assistive Technology and Occupational Therapy

The Individuals with Disabilities Education Act (IDEA, 2004) defines assistive technology (AT) as, "any item, piece of equipment, or product system whether acquired commercially off the shelf, modified, or customized that is used to increase, maintain, or improve functional capabilities of individuals with disabilities" (p.118). In other words, AT can assist a person with a disability to do something they normally would not be able to do on their own (Netherton & Deal, 2006). Some examples of AT include cognitive aids, adaptive toys,

communication aids, alternative computer access, aids to assist walking, dressing, visual aids, and hearing aids (Netherton & Deal, 2006). The different types of AT also range from low tech devices including: switches, picture boards, pencil grips, shoe horns, and magnifiers; to complex high-tech devices including: computer devices with eye gaze, smart phones, and power wheelchairs (Simpson, McBride, Spencer, Lodermilk & Lynch, 2009; Wilcox, Dugan, Campbell, & Guimond, 2006). AT supports the engagement in daily occupations and the basic functional needs within the home, school and community (AOTA, 2016). AT services directly assist an individual with a disability in the selection, acquisition, and use of an AT device. The selection process includes evaluation, fitting, and customization of services and training (Assistive Technology Act, 2004; Asselin, 2014). The acquisition of AT tools should depend on the identified unique needs and occupational performance deficits of the client.

OTs can be members of interdisciplinary AT teams and have unique expertise on AT and engagement in occupations (AOTA, 2015). Occupations are purposeful activities that an individual does to occupy their time. These activities are meaningful and valued by the individual, and also part of the individuals' life roles and identity (AOTA, 2014). Occupations include activities of daily living (ADLs), work, play and going to school. Various client factors and performance skills can influence the individual's occupational performance and their ability to participate in these occupations. Further, AT falls within the scope of OT practice (AOTA, 2015). Several factors OTs consider when making an individual – AT match includes: context, client strengths, performance skills, and the specific AT features. OTs are often involved in AT as it relates to alternative access, (e.g. physical modifications and software applications that support access). For example, computer access, literacy and written communication can be greatly supported by software features including text to speech (TTS), speech recognition (SR)

and word prediction (WP) (Batorowicz, Missiuna, & Pollock, 2012; Quenneville, 2001; Simpson et al., 2009). These features were once exclusive to highly specialized AT software; however, currently one can find the features of TTS, SR and WP built in to today's mainstream technology, such as word processing programs and smartphones. These features are also build into complex communication devices, also known as alternative augmentative communication (AAC) speech generating devices (SGD).

The literature has shown that AT can support written expression and language arts in many important skills including spelling, typing speed, grammar, legibility and reading comprehension (Adebisi, Liman & Longpoe, 2015; White & Robertson, 2015). However, there is limited research on AT and the impact on occupational engagement. Further, there is little research on occupational engagement from the clients' perspective using the AT including specific software features.

Assistive Technology Software Programs for Written Expression.

In 1998, Bryant and Bryant, along with Flanagan, Bouck, and Richardson (2013) stated that AT can be an effective instruction that can support learning for students with disabilities. AT can support increasing student participation and foster social acceptance within the classroom (MacArthur, 1996; Simpson et al., 2009; Quenneville, 2002). Additionally, AT devices and software can support written expression, reading, spelling, and organization. AT software featuring TTS, SR and WP offers many benefits.

Text to speech (TTS). TTS reads aloud written text, often while simultaneously visibly highlighting each word as it is read aloud (Adebisi, Liman & Longpoe, 2015). This feature supports multi-sensory engagement in reading and proofreading (Simpson et al., 2009). In a study looking at the TTS features of Kurzweil software, five students, ages 8-10, with reading

disabilities demonstrated improvement in comprehension and fluency (White & Robertson, 2015). TTS can access a wide range of text including PDFs, email, websites, e-books and more to meet the needs of the users (Asselin, 2014; White & Robertson, 2015).

Speech recognition (SR). SR recognizes the user's pronunciations of words and translates the spoken language into text or will recognize spoken commands to activate devices and software. SR is sometimes also referred to as voice recognition, but for this paper we will exclusively refer to SR for all features activated by speech. SR systems are most useful for those with clear speech articulation (Adebisi et al, 2015). White & Robertson (2015) found that students had a positive experience writing and editing text with Kurzweil[©] software as it afforded them independence and they were able to dictate their ideas on paper using SR.

Word prediction (WP). WP is another AT feature that supports written communication. WP "guesses" words as the user is typing and provides a list of possible words and phrases they might use next in a sentence based on initial letters, sounds, or words (Handley-More, Deitz, Billingsley, and Coggins, 2003). WP reduces the amount of typing and keystrokes required by the user and can be useful for individuals with graphomotor or handwriting issues, spelling challenges, and general motor control issues (Adebisi et al., 2015; White & Robertson, 2015). A study by Handely-More et al. (2003) included an OT intervention and training on Co: Writer®, a WP software, for students with learning disabilities and handwriting difficulties. Following the WP training, participants were asked to create stories based on preselected pictures. These stories were written using three different methods: handwritten, typed, and using WP software. The intervention showed that typing the story in a word processing program with WP, helped students increase typing speed, reduced the number of keystrokes, and improved spelling skills, grammar and punctuation (Handley-More et al., 2003). Based on the aforementioned features of

TTS, SR and WP, there are many conditions that can be supported by these types of AT devices and software.

AT Support for Specific Conditions

  Neurodevelopmental disorders. According to the American Psychiatric Association (2013), specific learning disorder (SLD) is a neurodevelopmental disorder that affects learning. The onset occurs typically around school age or before 18 years old. Individuals with SLD tend to perform below average in academics and require an increased amount of effort to complete projects compared to their age equivalents. Engagement in student occupations can be greatly impacted by SLD presenting challenges with core academic skills, such as reading, writing, and math. Though SLD impacts early academic experiences, it produces lifelong impairments in occupational performance, such as ADLs, continued education at the collegiate level, and employment during adulthood (American Psychiatric Association, 2013). Two types of SLD are Dyslexia and Dysgraphia. Dyslexia refers to a difficulty with decoding, spelling, and recognizing words (American Psychiatric Association, 2013). Similar to Dyslexia, Dysgraphia is graphomotor involvement causing impairments related to spelling accuracy, grammar and punctuation accuracy, and clarity or organization of written expression (American Psychiatric Association, 2013).

  AT with WP and TTS has been shown to be beneficial for written expression for students with SLD. Specific skills including forming words from their spelling approximations and building comprehension skills. In a study conducted on grade school students with reading difficulties, eBooks with TTS narratives greatly improved the students' accuracy in oral retelling and comprehension of the story (Gonzalez, 2010). In another study, Evmenoma, Graff, Jerome, and Behrmann (2010) found that the use of WP software in journal writing for students with

writing difficulties made large gains in spelling accuracy and composition rate. Not only did the students improve their written skills while using AT, they expressed that their experience was enjoyable and beneficial to their academic participation.

Conditions related to motor and access difficulties. Neurological disabilities can affect the central and peripheral nervous system and can also produce a myriad of learning difficulties related to cognitive and physical challenges. One of these conditions is cerebral palsy (CP). CP can be classified into multiple types that impacts movement, muscle tone, and coordination caused by an injury or lesion to the brain during intrauterine life or during childbirth (Atchison & Dirette, 2012). The different variations include spastic (hemiplegic, diplegic, or quadriplegic), athetoid, ataxic, and mixed CP. Across all types of CP, common symptoms include tone abnormalities, reflex abnormalities, atypical posture, delayed motor development, and atypical motor performance. Some variations of CP, especially mixed types and severe spastic quadriplegia, may involve cognitive and language deficits that impede function in occupations such as school and engagement with peers (Atchison & Dirette, 2012).

Spinal muscular atrophy (SMA) is a genetic condition that is categorized as progressive degeneration of neurons in the spinal cord anterior horn cells due to a deletion or mutation of the survival motor neuron one. Verhaart, Robertson, Wilson, Aartsma-Rus, Cameron, and Jones (2017) stated that the progressive degeneration leads to proximal muscle weakness, atrophy, and possible paralysis. Given the magnitude of motor involvement, SMA can greatly affect the ability to participate in occupations including: attending school, extracurricular activities, work, social interaction, and functional mobility.

AT for individuals with various neurological disabilities can address cognitive and physical barriers. Though physical limitations affect the ability to utilize common academic

tools, they also affect the accuracy of writing, spelling, and grammar. For instance, Mirenda, Turoldo, and McAvoy (2006) described that word prediction software such as Co:Writer® can improve spelling, writing speed, neatness, and grammar if implemented for students with physical disabilities. Providing individuals with motor needs the appropriate AT and features to match their unique needs can greatly increase access, learning, participation and potential in the classroom.

Assistive Technology in the Classroom

Facilitators. A major element of whether successful integration of AT into a classroom is possible is based on the teacher's previous education on AT, in-service workshops, and the use of co-teaching and support systems (White & Robinson, 2015). A teacher's previous education and familiarity plays a large role in their confidence when using AT as a teaching modality. Oftentimes, more experienced teachers tend to be more confident when using AT, and thus provide a more comprehensive education for the end user (Flanagan et al., 2013). Unfortunately, research shows that both special and general education teachers are not provided with enough information on AT use in the classroom through their formal or continuing education, or with in-service workshops (Flanagan et al., 2013). "While in-service special education teachers may have had AT coursework during their undergraduate or graduate education, few workshops or professional development opportunities exist outside of coursework to continually support teachers" (Flanagan et al., 2013, p. 24). This can leave teachers to feel unprepared in their ability to both choose appropriate techniques and implement them into the classroom. In addition to formal education, teachers within the research studies saw that successful in-service workshops provided further review of AT, a demonstration of the devices or software, and suggestions for

application of the AT in the classroom (Flanagan et al., 2013; Maushak, Kelley & Blodgett, 2000).

AT inclusion into the classroom can also be facilitated through co-teaching techniques, allowing teachers to work in collaboration to support the necessary AT implementation (White & Robinson, 2015). This technique is effective as it allows teachers to share the responsibility for teaching the student how to use the AT as a means to learn. Co-teaching provides necessary supports, allows for shared planning and goals, and creates an environment of continuous evaluation during instruction (White & Robinson, 2015). Although co-teaching techniques are not always possible, Adebisi and colleagues (2015) mentioned the trend for co-teaching is a partnership among the multidisciplinary team. Together, the special education teacher and the AT Specialist can collaborate to ensure a functional environment for the AT user. While teachers benefit from facilitation techniques of AT and will attest to its effectiveness, there are several barriers to AT in the classroom.

Barriers. Primary barriers to AT use in the classroom are the lack of training workshops, and the time consuming nature of setting up, configuring and maintaining the assistive device or software. As previously mentioned, teachers have self-reported, through research surveys, that pre-service education does not provide adequate training in AT use and ongoing professional development is essential (Flanagan et al., 2013). The integration of AT into the classroom presents several challenges when the teacher needs to create and teach a lesson plan for the student (Crider, Johnston, Rutledge, Doolittle, & Beard, 2014).

Flanagan et al. (2013) described the WP feature to cause some frustration amongst teachers. The WP software in the research could not accurately predict the desired word and

often presented with increased spelling errors. Teachers experienced the challenges that detracted from their instruction, and thus often failed to consistently utilize the technology (Flanagan et al., 2013). Furthermore, the flow of teaching was halted when the teacher needed to scan in specific worksheets or books, or when the student needed to transfer verbal speech into a hard copy essay or worksheet (White & Robertson, 2015). Teachers reported that it is time consuming to load all materials necessary for the child's learning experience and social occupations while at school, and that there is rarely information for managing and troubleshooting the software (Crider et al., 2014; White & Robertson, 2015). In addition to the barriers experienced from the teacher perspective, the students incurred their own barriers to assistive technology use in the classroom.

Despite the potential for performance skill improvements, AT can create a barrier between the end user and their peers (Batorowicz et al., 2012). There continues to be stigma surrounding AT. AT users that use AAC and SGDs can communicate, yet it is very different than typical verbal conversation. Not everything is available through AT such as reduced availability of popular nonfiction books. Finally, AT users possess a specific device that their friends do not (Adebisi et al., 2015; Flanagan et al., 2013; White & Robertson, 2015). In addition to AT use in the classroom, the school to home coordination for AT use is a significant component to programming.

AT Coordination: School to Home Environments

Although the home is another learning environment for students, various studies showed difficulty integrating AT into family routines. Due to size and weight of some AT devices, parents reported challenges in transporting devices between the home and school (Murchland & Parkyn, 2010). If parents were unable to transport the AT, they needed to locate a matching device for the home which resulted in extra costs and time as they had to wait for the AT to

arrive in the mail. Regardless, some parents found this easier than waiting for the school districts to complete the process of obtaining the AT because the approval process for funding and locating the best device for the student was already extended (Murchland & Parkyn, 2011).

Families purchased AT to complete homework assignments; however, studies have reported a low frequency of use at home (Huang, Sugden, & Beveridge, 2008). Children preferred to use their AT devices in the classroom because AT helped them engage with their peers. Also, parents used other techniques instead of the AT software because they are able to modify the environment to fit their child's needs at home (Day & Edwards, 1996). Another reason for decreased AT use at home is the decreased motivation amongst both children and their parents. At home, children preferred to spend their time engaging in their personal interests rather than working on school assignments (Day & Edwards, 1996). Families did not want their children to develop a negative connotation to their AT devices, especially if the children were uninterested in completing their assignments at home (Huang, Sugden, & Beveridge, 2008). Lastly, some parents had limited knowledge and support on how to use the AT making it difficult to help their children. Parents often found it easier to assist them without AT rather than troubleshoot the AT (Murchland & Parkyn, 2011). Better understanding of how families use AT at home with their children will expose barriers which limit participation in meaningful occupations.

Statement of Purpose

AT is within the OT scope of practice, thus OTs use AT strategies and applications to promote engagement in meaningful occupations (AOTA, 2010). AT features such as WP, TTS, and SR, can be used to eliminate access barriers for written expression as well as access to

dynamic AAC and SGD devices (Adebisi et al., 2015; MacArthur, 1996; Quenneville, 2002; Simpson et al., 2009). Current research has focused on the productivity of this type of AT, for example, increased typing speed, increased legibility, etc. (Flanagan et al., 2013; Handley-More, et. al, 2003; White & Robertson, 2015). Yet, there has been a lack of attention to the client's perspective about their experience with AT from an occupation centered approach. The purpose of this research is to empirically examine specific AT including features of WP, TTS, and SR in naturalistic contexts (e.g. home, school, community) from the perspective of the client, family and other key players in their lives (e.g. teachers, specialists, school personnel). Therefore, this qualitative, phenomenological study will use semi-structured interviews, naturalistic observations and records reviews, to focus on the lived experiences of individuals who are currently using AT in an in-depth case study analysis.

Research Questions

The research questions guiding this study were: (1) How does AT influence the lived experiences of the end user in his or her occupations in different contexts (classroom, at home, and in the community) from the perspective of the client, family and school personnel? (2) Within the different contexts, how are the features of text to speech (TTS), word prediction (WP) and speech recognition (SR) being used?

Theoretical Framework

Person Environment Occupation Model

The Person -Environment-Occupation (PEO) model was developed by Mary Law and

colleagues to better understand the interdependence relationship between people, their

occupations and roles and the environment in which they live, work and play (Law, Cooper,

Strong, Stewart, Rigby, & Letts, 1996). The PEO model has three major concepts and focuses on

the interaction and overlap that occurs with one another. The model assumes that its three major

components (P - person, E - environment, O - occupation) continually interact across time to

influence interdependence. In fact, how well the PEO overlap with one another results in the

amount and quality of occupational performance (Law et al., 1996). Therefore, improving or

enabling skills and patterns in occupational performance leads to increase engagement in

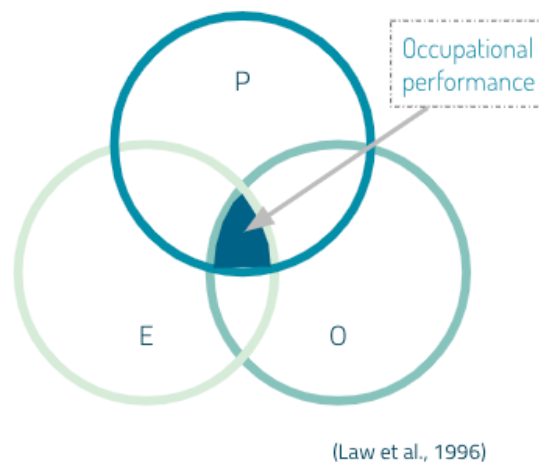occupations or activities.

(Law et al., 1996)

Figure 1 Person Environment Occupation Model

In the PEO, the P - person is described as having a set of learned or innate skills

in addition to life experiences that shape the person they are today. The P - person has various

life roles that change over the lifespan and within different contexts. For example, a child in school is a student, classmate, or a friend. Alternatively, at home the child is a daughter, son, sibling, or pet owner (caregiver). The model assumes that the person is dynamic, motivated and always evolving, constantly interacting with the environment. The life roles defining the individual will influence the way in which the person interacts with the environment and occupation (Law et al., 1996).

The E - environment is the setting in which the occupation takes place. The environment can have cultural, institutional, physical, and social factors (Law & Dunbar, 2007). At school the locations of classroom, playground, library and the cafeteria are physical environments; whereas, the students and classmates create the social environments. Furthermore, the environment can influence the behavior of the person and vice versa. For example, students behave more quietly during an exam versus how social and talkative they are during lunchtime. The environment must be considered in order to determine what factors have an enabling or constraining effect on the occupational performance (Law & Dunbar, 2007).

As defined by AOTA (2014), O - occupations are daily life activities in which people engage throughout the lifespan. Law and colleagues (1996), described occupations as purposeful activities and tasks completed to meet the intrinsic needs of the person for "self-maintenance, expression, and life satisfaction" (p. 175). Though the activity, task, and occupation are defined discreetly, the PEO model combines the three terms. Occupations are carried out within disparate contexts of roles and the environment where an individual is engaging in their occupation (Law et al., 1996).

Optimal occupational performance is dependent on the interactions of P-O, O-E, P-E, and interactions of the three factors of P-E-O; the better the relationship between all components the

greater the occupational performance will be. This relationship is represented in Figure 1 with the overlapping spheres. When the P-E-O components fit closely together, the greater the fit, or harmony between the components. The overlap in the center of the spheres represents the occupational performance or the dynamic experience of a person engaged in an occupation within an environment over time (Strong et al., 1999).

PEO and AT

The PEO model informed this research by exploring the lived experiences of individuals using AT from their unique perspectives and the impact of AT on their occupations. The goal of OT is to enhance or enable meaningful participation in the occupations important to the individual. The AT at the level of the P can afford performance skills not otherwise possible. The person to AT match is essential, not only based on the person's challenges, but their strengths, motivations and goals. Matching the client's skills, strengths, weaknesses, preferences, and environmental contexts to the AT features is a distinct role that the OT practitioners can fulfill. In addition, OTs work with individuals to develop the skills and strengths that allow them to utilize their AT to the best of their abilities (AOTA, 2015).

By employing AT at the level of E- environment and O - occupation, OTs look to accommodate and modify the environment and activities so that the student can access and participate in occupations. More specifically, a P - person with SLD and/or physical access needs may benefit from TTS, WP and SR to access and participate in written expression or operate an AAC / SGD more efficiently. OTs also design the tasks and environments to facilitate a greater interaction for the AT end users. The combination of OT task analysis and the use of AT in the E - environment and O - occupation creates a greater opportunity for the person to participate in their environmental contexts and meaningful occupations at home, school and in the community.

Ethical and Legal Considerations

This qualitative capstone research project was guided by The Ethical Principles and Standards of Conduct presented in the 2015 Occupational Therapy Code of Ethics, and underwent approval by the Institutional Review Board for Protection of Human Participants (IRBPHP) at Dominican University of California. The Ethical Principles have set parameters to guide ethical decisions, resolve ethical issues, and provide the dimensions for the occupational therapist's professional behaviors (AOTA, 2015). The IRBPHP provides guidelines to protect the rights and welfare of human participants and uphold legal regulations (IRBPHP, 2006). Due to the sensitive nature of this study's population, the research developers are upheld the principles of beneficence, nonmaleficence, autonomy and fidelity to guide this study.

Beneficence and nonmaleficence are defined as demonstrating concern for the well-being of the participants, and refraining from performing activities that may cause additional harm (AOTA, 2015). The researchers underwent a full IRBPHP review in accordance with these principles. The full review is intended for vulnerable populations who may experience more than a minimal risk from participating in the research (IRBPHP, 2006). Additionally, this capstone project values the principles of autonomy and fidelity for its participants. These principles require that the researchers respect the individual's rights, privacy, and self-determination to consent, participate, or withdrawal from this confidential study at any time. Furthermore, all researchers and professionals are expected to treat their participants and colleagues with respect, fairness, and integrity (AOTA, 2015).

Prior to data collection, capstone researchers obtained agency permissions from our community partner for participant recruitment (Appendix B). A full board IRB review requires

all researchers to obtain informed consent or assent from the minor students, with additional parent and teacher consent who are involved with the interview process (Appendix E, F, H, & I). In the event that a participant could not provide a written or verbal consent, or was under the age of 18, a proxy consent form (Appendix G) was provided for the caregivers or conservators of the respective participant. Each participant received a Bill of Rights (Appendix C). Lastly, the study used multiple media outlets, such as emails, video and audio recordings (Appendix J). These media platforms were utilized to communicate with students and to collect data for analysis (IRBPHP, 2006). This research was approved by the Dominican University Institutional Review Board, IRB#10668.

Qualitative Methods

Design

The researchers conducted an in-depth analysis of several individuals' lived experience as assistive technology consumers. The study explored their unique perspective, context and occupational impact of AT. AT users, parent(s) or guardian(s), and school personnel (e.g. teachers, school staff, therapists, etc.) were interviewed. The participants were observed in their natural environments while using their AT. The goal was to understand the meaning attached to their experiences as it pertains to the participation of occupations with their current AT.

Population

The participants were a convenience sample obtained in collaboration with a local school district in Northern California. Participants were chosen based on the type of AT they are currently using and their interest in participating in the research study. The age range of this group was between 12 to 21 years old and the grade level ranged from 5th grade to junior college. Inclusion criteria required individuals to be current AT users and to have some version of AT that included WP, TTS, and/or SR features. Exclusion criteria was AT use for less than one year and being younger than 10 years old.

Data Collection

This study used several modes of data collection. (1) Semi-structured interviews to explore the lived experiences was conducted with the AT consumer, their parents, and school personnel. The interviews were video and audio recorded, then transcribed verbatim. (2) End users were video recorded using their AT in naturalistic settings such as, in the home, school and

community. (3) Researchers collected artifacts in the form of records, which including IEPs, related goals and evaluations pertinent to AT.

Procedures

  Overview of study. Researchers conducted a qualitative study using interview methods and observations with each subject to understand the impact of AT on their individual occupations from the consumer's unique perspective. Semi-structured interviews were scheduled and located based on the participant's convenience, which included the home, classroom, and Dominican University of California Campus.

  The research team developed a semi-structured interview protocol (Appendix A) with open-ended questions to gather the broad information and established overarching concepts of AT use and occupation. Through follow up questions, researchers expanded on specific topics based on the individual responses. A specific semi-structured interview protocol was written for each participant: the AT consumer, the family, and the teacher or other pertinent school personnel (See Appendix A for Semi-Structured Interview Questions).

  Data collection. During the interviews, a video recorder (video camera connected to MacBook laptop) and audio recorder (microphone connected to MacBook laptop and iPhone) were used to record participants' responses. The video and audio recordings were transferred from portable laptop and iPhone to flash drive within 72 hours. Researchers transcribed interviews verbatim from audio and video recordings using manual transcription and transcription software TRINT™, Express Scribe, and Temi[©] (www.trint.com; www.nch.com.au; www.temi.com). All identifying information was removed from the transcriptions and replaced with pseudonyms to protect participant identity. Participant records included IEP chart review

and evaluations related to AT that families volunteered to share with the researchers. Only researchers had access to all files on the password protected Google Drive.

Data Management and Analysis

      Analysis and coding. Data was analyzed using qualitative methodology and the Constant Comparison Method (Corbin & Strauss, 2008; Dye, Schatz, Rosenberg, & Coleman, 2000). Codes and themes emerged from the data and were not predetermined by the researchers. However, the approach to developing the codes were based on OT theoretical underpinnings of PEO and AT. Data was analyzed by the research team to identify patterns and similar themes, which were then grouped accordingly. Dedoose© (www.dedoose.com), a secure data management and mixed methods software program was used to store and code transcripts.

      Strategies for trustworthiness. Qualitative methods were used to analyze the video and audio recordings of the semi-structured interview, naturalistic observations, and records reviews. Triangulation was used to confirm data through various sources (Merriam & Tisdell, 2016). These sources included artifacts, collected data, and personal observations of researchers, to compare the coded data to establish credibility. The code book was determined with 100% agreement amongst four researchers and faculty advisor. Of the 12 transcriptions, 25% were coded with 100% consensus agreement across four researchers. In addition, revision of categories was confirmed through group consensus amongst all researchers. The remaining 75% of the transcriptions were then coded individually by the research team.

      Strategies to control bias. During data analysis, multiple perspectives of the end user were used to eliminate bias. Due to the observation and interview process, researchers learned vicariously through the end user. To interpret the true perspective of the end user and their AT

experience, themes were compared to the reports of the parents and teachers. After coding was completed, data was checked by the research team based on the similarities and differences for each perspective, context, and theme represented in the developed coded categories.

Results

The research questions guiding this study were, (1) How does AT influence the lived experiences of the end user in his or her occupations in different contexts (classroom, at home, and in the community) from the perspective of the client, family and school personnel? (2) Within the different contexts, how are the features of text to speech (TTS), word prediction (WP) and speech recognition (SR) being used? The following data was collected based on semi-structured interviews conducted with end users, family, special education teachers, and a speech language pathologist.

Participants

Our sample consisted of a total N=15 participants: AT end users, N=5; family members, N=6 and school professionals, N=4. Based on the scheduling and the needs of the participants, 9 out of 12 interviews took place in the home with the AT end user and family members. Two interviews with teachers occurred in their classroom on the school campus and one family met with the research team at the Dominican University of California campus for their interviews. All interviews were individual, with the exception of one focus group of school personnel.

AT end users. Although not the intent of recruitment, the AT user sample was fairly homogeneous consisting of AT end users with complex communication needs as well as complex motor presentations. The sample was predominantly nonverbal to low verbal with the exception of one participant who was verbal yet with dysarthria. The motor presentation of our sample was highly complex, wherein all participants were using powered wheelchairs and mounting hardware to support all AT with the exception of one participant who accessed AT from a wheelchair tray attachment. AT access across the sample included: two exclusive eye

gaze users, one user with joystick switch access operated by subtle shoulder adduction in an antigravity position, and two users who accessed via direct select using one or two fingers given limitations of spasticity and range of motion. The patient demographics (see Figure 2), the predominant AT used and the access methods (see Figure 3) have been summarized below.

Due to the nonverbal to low verbal levels of the participants, SR as a software feature was not utilized by this sample (see Figure 3). The one participant who was verbal with dysarthria reported attempting the use of SR on her iPhone. However, the system was ineffective in capturing her words due to the dysarthria and therefore she does not use the SR feature. The AT software and apps used were many and varied amongst our sample. For example, Adventurer used the Co:Writer® software and Notes app on the iPad mini to type up notes for school and personal use. She additionally used another app to read books with a TTS feature. During the interviews, each participant described how they used multiple applications for different purposes that operate within their respective AT devices (see Figure 3). Each device the participants used served a purpose to engage in their chosen occupations. For example, Rose used a Tobii Dynavox©, which is a dynamic AAC, SGD to communicate, send emails, and complete schoolwork. She then had her phone and digital camera that attached to the Tobii Dynavox©, which allowed her to operate these extensions with her switch. The combination of these devices, software, and phone apps facilitated Rose's participation in her occupations, which included dating, watching TV, socializing, photography, and her education.

Participant	Sex	Age (years)	Grade	Diagnosis
1. Frenchie	Female	12	7th	Cerebral Palsy
2. Rose	Female	21	College	Spinal Muscular
3. Secret Texter	Male	17	12th	Cerebral Palsy
4. Miss Independent	Female	17	12th	Cerebral Palsy
5. Adventurer	Female	17	12th	Cerebral Palsy

Table 1 Participant (pseudonyms) Demographics and Diagnoses.

Subjects	Apple Product	AAC/SGD	WP	TTS	Access Method
1. Frenchie	NA	Tobii Dynavox[©]	X	X	Eye gaze
2. Rose	iPhone	Tobii Dynavox[©]	X	X	Switch
3. Secret Texter	iPhone	Tobii Dynavox[©]	X	X	Eye gaze
4.Miss Independent	Laptop, iPhone	NA	X	X	DS - Touch typing with 1-2 fingers
5. Adventurer	iPad Mini, iPhone	iPad Mini, iPhone	LAMP Words for Life[®] (On iPad Mini)	X	DS – Index Finger

Table 2 AT End User - Participants, AT Devices and Access Methods. Note: Augmentative and Alternative communication (AAC); Speech Guided Device (SGD);Word Prediction (WP); Text to Speech (TTS); Speech Recognition (SR); Direct Select (DS)

Family members and professionals. Based on scheduling logistics, we were able to conduct interviews with six parents of five AT end users, Secret Texter's Teacher, and a focus group with Adventurer's teacher. Within the focus group, the school personnel also included a speech language pathologist (SLP) and a special education teacher. The SLP described her interactions with Adventurer, however she did not directly work with her. Family members included one parent for four of the five AT end users, with each interview conducted individually. Interviews were planned to be individual, yet family and end users would chime in given that the interviews took place with all participants present.

Themes

Our sample reported the influence of AT across meaningful occupations in different contexts of the classroom, home, and community. Each participant reported utilizing or facilitating the use of their device across each setting. Through the use of the Constant Comparison Method, key themes were identified (Dye et al., 2000). There were four overarching themes that informed AT meaning for occupational engagement: people, match, features and context (see Figure 5). Our analysis also identified facilitators and barriers within each of the four themes.
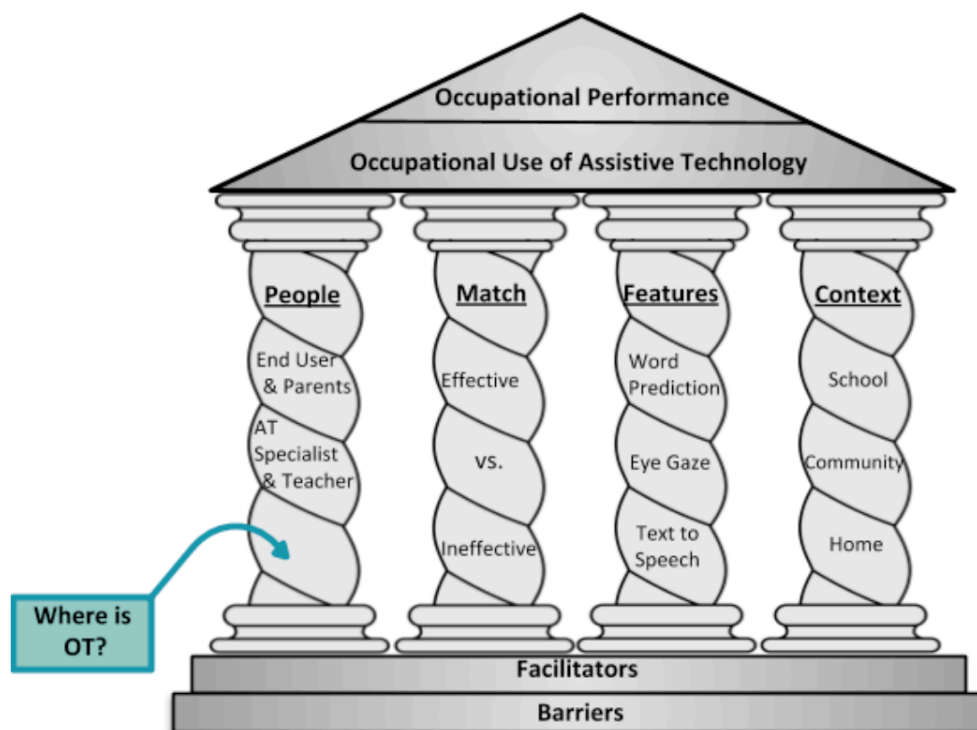
Figure 2 Pillars of AT: Themes that impact the presence of AT and the occupational performance of AT users

People. Within the theme of people, the AT end user, teacher, parent, and AT specialist were identified as key players in helping make AT present across different contexts.

AT End user. The end user problem solved to make the AT devices and features work properly for engagement in meaningful occupations. For instance, end users reported doing their own research or described to their parents and teachers how to setup a program on their device. Rose's mom shared an example of how Rose is now in charge of her own AT. Her mother said, "And I hate to say, I'm just not as involved because she's so independent now" (Rose's mom, personal communication, April 6, 2018). Often, end users learned to be independent with their devices and became proficient in the use and troubleshooting process when an error occurred. For example, Adventurer's mom explained, "If the troubleshoot is more specific to [Adventurer's] assistive technology program, she knows more than I do" (personal

communication, April 27, 2018). This was another example of an end user's independence with their device.

In addition to personal problem solving, individuals were able to engage in their own hobbies, similar to their peers. Rose enjoyed using her device to access online shopping, social media, and to watch TV. Her mom stated, "She does photography. The Camranger [connects to the camera], and operates the Canon camera for her" (Rose's mom, personal communication, April 6, 2018). Rose was able to take personal pictures whenever she wanted. Taking pictures was part of Roses' identity, and facilitated her independence. This was an example of how AT allowed the end users to partake in the leisurely activities on their own.

Teachers. Teachers and classroom paraprofessionals were also highly involved in assisting the use of the AT devices for end users. Their roles included positioning their students, internet configurations, troubleshooting, and facilitating participation in class with the use of AT devices. Secret Texter's mom described how teachers find different ways to utilize their students' AT efficiently in the classroom. She explained, "Teachers who care will find options to speed along the process and engage the student and help them along academically a million times more" (Secret Texter's Mom, personal communication, April 9, 2018). Often, having the AT set up and ready to go, facilitated better participation in class. Teachers also described how they often collaborated with new ideas and problem solved together. Secret Texter's teacher expressed, "We support each other a lot in this field. There's a lot of collaboration, a lot of support and a lot of sharing of ideas. It's just part of our profession" (Secret Texter's Teacher, personal communication, May 23, 2018). Through the collaboration amongst school professionals, special education teachers were able to help problem solve situations to facilitate

the participation of their students. These examples illustrated how teachers played an important role in facilitating the occupational use of AT in the classroom.

Many teachers relied on the paraprofessionals to work with students, help preload the question and attend to any AT technical problems as these occurred often. However, when new paraprofessionals join the classroom or new specialists join the team, they would be unfamiliar with the AT and this hindered teaching and learning. A special education teacher further elaborated, "If somebody new comes in the classroom to help out, like a specialist or a substitute, my students might have a lot to say but that person doesn't know how they communicate." (personal communication, May 15, 2018).

Time is always a challenge and in AT this is no exception. When planning and collaborating with parents, teachers often reported that they do not have time to meet outside of the classroom to stay up to date on student needs. In addition, having a rotating class schedule and various teachers, communication and the opportunity to prepare accordingly was difficult. The lack of consistency of teachers throughout the transition of classrooms in the high school setting made it difficult for continued implementation. Further, there was an inconsistency in the level of training teachers possessed in facilitating the use of AT. Frenchie's mom expressed concern, "I don't know if they train the teachers. I don't think they are trained at all. There is only the new special education teacher who got trained for an hour. They don't know how to use the device" (personal communication, April 5, 2018). Parents also learned to advocate for their children and to compensate for the lack of training, communication and hectic schedules for everyone involved.

Parents. Parents advocated for the appropriate AT services for their children, assisted in setting up devices, and maintained the AT over time. When a parent knew what was best for their child, they did not stop until they achieved a favorable outcome. Rose's mom mentioned,

> When the AT specialist first met Rose he thought that she was too young, but I pushed it. I told him she needs it because of her physical disability. She can't move, but her brain is fine. So I knew that she had to get that communication out there (personal communication, April 6, 2018).

Rose's mom advocated for her daughter's need to access AT. Other times, parents were involved with proper positioning, mounting of the device, and keeping the devices charged and ready to be used as needed. Secret Texter's mom made sure that her son's Tobii Dynavox© was charged and positioned properly. Before starting the interview, she asked her son, "Is it in the right position for you?" (Secret Texter's Mom, personal communication, April 9, 2018). She wanted to make certain that the device was properly positioned in front of him so that the device can capture his eye gaze, thus facilitating his participation in this research study.

AT to person match. The assessment process to match AT to a person required teamwork and detailed trial and error with each individual. Even after devices were obtained, some features were more efficient than others. End users expressed the need for more practice with their AT device and its features. Miss Independent stated, "Learning does take a lot of time, especially if it's brand new and you get it by yourself without an AT Specialist's help or without a professional's help" (personal communication, April 23, 2018). There is a learning curve for the end users to become familiar and fluid with the AT features.

Effective match. Our participants noted the power of AT particularly when the features were the right match for the person. Teachers from our sample were able to recognize the potential of their students. Furthermore, once the best access methods, features, and programs were implemented, academic participation was enhanced. Adventurer's teacher stated,

> For kids to be able to have equal access amongst partners and settings is key. To see [Adventurer's] progression from where she was on a designated communication system, which gave her very little feedback and options to write out what she wants to say, compared to now where she is able to write through the assistance of Co:Writer® and word prediction (personal communication, May 15, 2018).

This teacher noted the impact of having the right AT match to the person and their given activity and occupation thus increasing their occupational performance. Another parent expressed Frenchie's experience, "I will say that she has had the Tobii© for two years now and that's when we saw a huge change in our communication because it was working" (Frenchie's Mom, personal communication, April 5, 2018). The effective match enhanced the end user's communication based on their current performance skills.

Ineffective match. Despite the improvements that AT contributed once the best match was established, the ongoing process of individualization, customization and training was challenging amongst end users. Barriers were also experienced when addressing participation in school, such as completing assignments. Some participants felt that when using the TTS feature, the voice output was an ineffective match. Secret Texter's mom stated,

> He does not like the voice at all. So it's hindering him and he doesn't want that to be his voice. So, the AT specialist is working on other options. There are some already

programmed on there but there's no teenage boy option. It's toddler, grown robotic man or woman, or southern accent (personal communication, April 9, 2018).

The limitations to the voice output were expressed by other participants. For example, Rose, also expressed, "It had more robotic voices and I was restricted on word choice" (personal communication, April 6, 2018). Although AT gave these individuals a voice, the voices did not always represent the individual's personality. A person's voice is characterized by the individual's age, tone, inflection, and personality. Besides the discrepancy with the voice, access issues due to complex motor needs were a common factor in our sample. The access method relied heavily on the client factors, performance skills, and the occupation where the device was needed. Secret Texter's mother expressed,

We have used an iPad, and because of the physical immobility issues, it was very hard for him to just tap the touch screen. When [Secret Texter] tried a surface pro tablet with him using a joystick as the cursor, when it was in Bluetooth mode, was extremely long and arduous because he would have to use the cursor on the keyboard of the tablet. It took forever to string together sentences (personal communication, April 9, 2018).

Another example of physical access limitations and need to obtain the correct access match was provided by Rose's mother. She commented on their process of trial and error using the eye gaze and switch access methods. She stated,

We tried to get eye gaze and switch. She doesn't really like the eye gaze as much because she can't move. It was hard to calibrate, but if she ever got to where she couldn't move her hand as much, she'd have to do the eye gaze (Rose's mom, personal communication, April 6, 2018).

Our participants had to possess the physical capabilities, including body positioning, fine motor skills and gross motor skills, to use certain access methods. Frenchie's mom said, "[AT] has its limits, but it has been life changing for Frenchie. It's a process, so it's not over yet" (personal communication, April 5, 2018). While the device they have now increased Frenchie's participation in occupations, there were still many barriers she faced while using the device. The match was an ongoing process as client factors and performance skills changed throughout the lifespan.

Features. The end users utilized specific features to enhance and access their AT device. WP, TTS, and eye gaze were the three main access features of our sample. WP was used to improve the spelling and typing speed in all end users. When the end users did not have the motor ability to use direct selection or switch, the end user utilized eye gaze. TTS was frequently used when it came to verbal communication and academic materials.

Word prediction **(WP).** All of our participants either tried WP or are currently using WP, which is now present on most mainstream devices. For our sample, WP provided efficiency in communication and participation in occupations. Miss Independent noted the differences between WP options and her preferences based on specific features and what is most expedient. She shared, "I used autocorrect. I use the word prediction actually on my phone because I can just press it and there's a lot fewer options. There's only three" (Miss Independent, personal communication, April 23, 2018). Despite WP was useful when Miss Independent is on her phone, it was sometimes not accurate with other programs. She expressed, "Sometimes Co:Writer® can glitch up. Like when you type something, it doesn't always type in the word that you want" (Miss Independent, personal communication, April 23, 2018). As an additional example of how WP was efficient, Secret Texter's mother stated,

So the word prediction is very helpful because it also remembers the words he's used before. So it will pop up and he'll be able to use his own past language. It also cuts down the time (personal communication, April 9, 2018).

Using a device to communicate is not as efficient as speaking verbally, yet the use of WP can decrease that response time compared to individuals who do not use WP and rely on spelling out words individually. However, despite these experiences, our AT end users did not use the WP as frequently.

Eye gaze. Two of the participants used eye gaze as their only access method to their AT device. When asked how he felt about using eye gaze, Secret Texter responded, "It's better than the one I've tried over the years" (personal communication, April 9, 2018). His mother stated, "Eye gaze is definitely a lot faster" (Secret Texter's Mom, personal communication, April 9, 2018). The two participants found it to be more effective than the other forms of AT access they used in the past.

Many larger devices are not portable, and mounting issues for correct eye calibration of devices with eye tracking systems were encountered. Families experienced barriers because the device could not be mounted accurately for diverse activities. Frenchie's mom stated,

[Frenchie] uses a walker and a bike. We cannot use the device on either one. First of all, it's moving. So the eye gaze, the downside is that it has to be stable, because her eyes cannot get the boxes (personal communication, April 5, 2018).

Unfortunately, mounting issues decreased socialization. Adventurer's teacher stated,

It's a real issue as to how you position so that you've got the eye gaze where you can also

be a participant socially. Again, where you're looking is what you're thinking about. So I

think it's something that's going to take some real artwork to figure out positioning.

Additional mounting issues occurred when the end user required eye gaze. The device was

positioned in front of the end user; however, navigation was not practical as the device

obstructed the view. Secret Texter's mom also spoke about barriers to navigation while using a

mounted communication device and expressed,

I'd say it's still kind of cumbersome, and Secret Texter cannot drive a wheelchair and

have the communication device in front of him. So it has to be a swing away situation.

He's driving [the wheelchair], and then he stops and has to have help putting it back in

front of him so he can talk to someone (personal communication, May 15, 2018).

Eye gaze promoted faster and more efficient access yet even this sophisticated technology

uncovered logistical barriers.

Text to speech (TTS). TTS was also a frequently used feature in our sample. Most

participants did not have a means to verbally communicate before obtaining their devices.

Additionally, the presence of TTS in mainstream devices, such as Apple devices, made it easier

to access. Adventurer's mother stated,

The text to speech, a lot of that is just an accessibility feature from the iPad. You

highlight it, you ask it to speak for you and she's using that. That's what I mean. Some of

the things on the iPad are just regular features of the iPad or accessibility features of the

iPad that she's using, and then there's the LAMP program on top of that (personal

communication, April 27, 2018).

Fortunately, the AAC / SGDs provided them a voice, which increased their ability to verbally communicate with peers, teachers, and family. For some end users, TTS was the feature used for reading academic materials and school work in addition to their verbal voice. Miss Independent described how TTS assists with her writing in school. "Because I'm not the best at writing or going back, I find it helpful. I can get the computer to read back to me, so I can hear how it sounds" (personal communication, April 23, 2018). The TTS feature offered end users other styles of learning in addition to being used as their voice.

Context. The use of the AT varied based on context, which included home, school and community. Occupational engagement for end users within each context was affected by their interactions with different people: family, friends, peers, and people in the community. Based on these interactions and the ways the AT was being utilized within each context determined their performance level of occupational engagement. Participants reported ways AT benefited or hindered their occupational engagement in each context. However, AT supported the communication and socialization across all settings.

Home. Within the home, AT was used to facilitate the participation in the end user's leisure activities, homework, and family time. Leisure activities included watching videos/movies, taking pictures, and listening to music. Miss Independent said,

> I find it very helpful and useful because without it I would not be able to do like any of the assignments for school like any of the free time, like movies, Games, TV, any of that. That would make my life very hard, very reliant on other people to help me do my work (personal communication, April 23, 2018).

Miss Independent was able to engage in her meaningful occupations and participate in the same activities as her friends and other teenagers. Some family members expressed an interest in their AT devices at home and facilitated a familial interaction. Those with siblings occasionally saw the AT device as a toy because some devices, such as the iPad, have game apps. Adventurer's parents said, "They all get into it. She likes to tease her brothers and they tease her. They like to type things on her iPad, which she doesn't like. It's her domain. And she says 'no, you can't type. I do that'" (personal communication, April 27, 2018). These interactions and occasional sibling fights still occurred with the use of the AT, which is a natural part of the family dynamic. Other end users described how they told jokes to one another or they would send funny texts to their parents using their AT. Secret Texter's mom said, "I turned around and I hit my shoulder on the wall going in the kitchen and he texted dad, my husband, immediately and said, 'help me come home. Mom's going crazy', but he accidentally sent it to me too" (personal communication, April 9, 2018). Secret Texter's mom continued to describe the story as she was able to read all the jokes her son and husband were texting about her. These family dynamics are all part of the human experience, and each participant described a similar story in which they were able to participate and enjoy in their meaningful home occupations.

While AT has its benefits, it was not always used in the home. Some parents found communicating easier and faster with their child at home using nonverbal gestures and cues instead of their AT device. These gestures and routines were established prior to receiving the AT devices. Due to the labored process of writing out a response, most parents were observed during the interview using these nonverbal cues to get a quicker response.

School. AT helped the end users engage in school, such as class assignments and in overall participation. Our AT end users had a range of educational programming across the

continuum including general education or a special education classroom focused on community based instruction. Since most of the end users were in middle school or high school, with the exception of one taking college classes, they also had the tricky dynamic of multiple teachers and a rotating class schedule. End users reported utilizing their AT devices and various apps in classrooms primarily for reading, writing, presenting in class, along with communication that occurred in the classroom. Miss Independent stated, "Technology has helped me a lot because without it I couldn't be able to do my homework or any of my school assignments or take notes or any writing assignments or any school work in general" (personal communication, April 23, 2018). Miss Independent's AT allowed her to participate in her classroom along with her peers. She also stated, "I try to get as much of the notes that I can, but [my aide] is there for back up notes and she actually writes every single word down" (Miss Independent, personal communication, April 23, 2018). With the support of her classroom paraprofessional, Miss Independent was able to supplement some of the physical challenges and amount of time needed to take notes on her device in order to keep up with her class work and assignments. Secret Texter's Mom described a similar fatigue of using AT devices,

> Secret Texter does most of his homework, almost all of it in school, during learning lab or in another class. Since he's gotten the eye gaze, he is exhausted after school because it's a whole different way of using your brain, mind and eyes. It's challenging, and fatiguing (personal communication, April 9, 2018).

The physical and cognitive fatigue of using AT, whether with the eyes, hands, or limbs impacted the sustainability and focus of end users. While these scenarios were not described by teachers, parents reported the decrease in use of AT after coming home from school in order to give their children a break.

On the other hand, teachers described different teaching styles and techniques including technology to meet the needs of the students. A special education teacher used visuals through projecting information and presenting to the class. She described,

> Making sure we have a lot of visuals going on is helpful. If they're researching something, then they can pull up what they're researching on the Internet and then we have the big screen so we can mirror it with the Apple TV. It's being shown when they're presenting what they learned (Special Education Teacher, personal communication, May 15, 2018).

Integrating the use of technology outside of the AT personal devices allowed students to connect with one another on the same platform and is an example of universal design for learning (UDL). The special education teacher further described how students can connect their AT devices to other devices in the classroom to project what they had found or written down to share. She also described certain phrases she uses to facilitate group discussion in the classroom between those who are verbal or rely on AAC as their voice. She explained,

> Something I'll use is 'raise your hand or look at me'. So if there's somebody who can't raise their hands or use their voice they can just look up at me with their eyes and then I know they want to go first and then that'll initiate using the whole communication. But it gives everyone a fair chance (Special Education Teacher, personal communication, May 15, 2018).

The special education teacher created opportunities for everyone to speak or volunteer first by using the phrase "raise your hand or look at me". This teacher's example about technology as UDL when responding in class was about inclusion and equity for all of the students.

Communication in school with teachers and classmates was essential to engagement in the occupation of education. Our sample discussed a delay in the communication when using an AAC/SGD device. Examples of delays occurred when end users were typing out one word at a time, or there was a typo they must start over. Adventurer's teacher explained how WP and TTS features on devices were helpful with communication for her student. She said,

> Adventurer uses the word prediction software Co:Writer® and it is super helpful instead of typing out every letter of every word, which is taxing. Again, we can't use speech recognition for any of our students but word prediction and text to speech are used every day for communicating, and they're sharing something that they've learned (Adventurer's Teacher, personal communication, May 15, 2018).

While these devices are helpful in increasing the conversational speed, additional support is needed to facilitate discussion in order to allow everyone to talk. Typical conversation in the United States moves quickly with back and forth dialogue, and each person takes turn speaking, almost seamlessly. The special education teacher added,

> It just takes so long. It's like a peer can come up to my student and say, 'hey, what's up? How's it going'? My kid is working on it, but it's going to take them a full minute. In that time, you feel awkward with empty space. The person wants to fill it up and they move on and say, 'oh, looks like you're good', and they ask a completely new question. Meanwhile, my student is still trying to respond (personal communication, May 15, 2018).

Teachers and paraprofessionals continually educated classmates to pause and wait for a response from an individual using AT. A technique used by teachers is preloading the students with the

question, so they can prepare their responses ahead of time. Adventurer's teacher said, "The big thing is being able to have pre-programmed, socially appropriate, quick access, so that you can engage so that there isn't lag, because it's just as effortful as for our kids as it is for the communication partner" (personal communication, May 15, 2018). This is an area where WP use in addition to having pre-programmed phrases would increase communication speed.

A major barrier identified by teachers was not having enough time in order to attend training sessions to be proficient in the AT devices, software and applications their students were using. There was the resource of attending the open lab times at the county technology resource center on their free time outside of the daily school schedule. However, all teachers reported not having enough time outside of class to attend these workshops. The time constraints also decreased the teacher's ability to adapt their curriculum to adapt the varied devices, especially when the lesson plan was a small portion of the class. Adventurer's teacher spoke on her solution to this time constraint,

> I have so little time to steal kids' iPads and put this all in and still be teaching. So
> something that I know that I do is just have a master iPad that has something that's
> accessible to most of my students so they can talk about that specific subject. The parents
> sometimes talk about it too. I had a parent who wanted me to let them know what we'd
> be learning about so that she can try to put it on the iPad. And then we try doing that and
> even the moms and dads can't keep up with it either. So I think that's a challenge
> (personal communication, May 15, 2018).

Although this is a practical solution, it was not ideal or customized to the students' needs based on the time constraints for not only teachers, but also parents in this example.

Lastly, teachers relied on the district for technical support for AT. Sometimes feedback took a few days to a few weeks, which made it difficult for the student to participate if they don't have a working device. A speech language pathologist said,

> Oftentimes we have to look at it from the low range to the high range because [technology] is always going to fail. If you don't have your voice output system how can you still let that kiddo access their curriculum as well as the pragmatics? (personal communication, May 15, 2018).

Teachers have to always been prepared with a backup plan for all technology. To compensate, some teachers described how they have provided a backup device to a student. When technology was completely unavailable, they adapted the lesson plan accordingly. For example, sometimes they switched to low tech options, such as use of pictures, in lieu of the AT being in place. Overall, end users relied on the support from the teachers and parents to facilitate the implementation of AT to its fullest capacity.

Community. End users described using their AT in the community and stated how each setting had its own facilitators and barriers. Various settings in which the AT was used by individuals included: restaurants, vacations, grocery and clothes shopping, work, and movies. Rose stated she uses her device for work, she shared, "I'm doing a website for a former student of my professor" (personal communication, April 6, 2018). She used her Tobii Dynavox© and a switch to design the website and communicate with her client.

In addition to work, participants utilized their AT for leisure activities, such as dating. Two end users described how they communicated on dates within a coffee shop, movie theater, and volunteer site. Adventurer's mom explained that, "[Adventurer] went to the seniors' home,

and then she got a crush on a boy, and wanted to talk to the boy. So we worked on that. And all

of a sudden, she's not so shy anymore" (personal communication, April 27, 2018). The

motivation to date encouraged Adventurer to practice using her AT device and increased her

communication. Additionally, Adventurer's mom stated, "She's much more outgoing, self-

confident, social, socially active with friends, and she's really changed a lot in the last four years,

as far as that goes" (personal communication, April 27, 2018). Adventurer overcame her

challenges of using her AT device to partake in dating, which resulted in an increased confidence

in herself, as well as increased usage of her AT device.

While AT facilitated Adventurer's experience in dating, Rose experienced a challenge at

the movies because of sociocultural expectations. Rose's mom explained, "At the movies it's

hard because we have to turn it off due to the light. She's gone out on dates to the movies and I

know it's hard because she can't talk to the person without it on" (personal communication, April

6, 2018). The device lacked the ability to whisper and maintain the quiet and darkness of the

movie theater environment. Rose was unable to participate in the movie theater experience in the

same way as other individuals who do not rely on AT for their voice. Despite these two end

user's ability to participate in the occupation of dating, AT was monumental in facilitating

socialization while still having its limitations.

All participants expressed their ability to socialize with others and develop meaningful

relationships through the use of the AT device. Moreover, the device allowed AT end users to

socialize with people face to face, but also through online communities. For example, Rose

utilized social media groups to communicating with peers who have a similar diagnosis. Her

mom stated,

She's on a [social media] group with women with muscular dystrophy, so she gets a lot

of ideas from people. She can talk to them about how she feels and if she has questions. I

think this has really helped her communicate with those people, or communicate with

anybody (Rose's mom, personal communication, April 6, 2018).

The end users interacted with similar peers online, and provided Rose an opportunity to share

unique experiences and increase her self-confidence. Other end users accessed social media or

online communication to socialize with family members and friends as it was easily accessible

for them from their device. Miss Independent used her AT to keep in contact with friends and

family she does not see often. She mentioned, "I usually text people and FaceTime people that I

don't get to see very much, that don't live here with us. I use Facebook and SnapChat and

Instagram" (Miss Independent, personal communication, April 23, 2018). End users were able to

socialize on the same platforms as their peers with the use of AT and engage in the same social

experiences.

When out in the community, participants described device volume, stigma, and lack of

awareness as barriers. The low volume decreased their participation and members of the

community often addressed the parents or caregivers instead of trying to listen to the end user

themselves. Adventurer's mom said, "[Adventurer] will initiate social contacts with strangers.

When she wants to say something more than *yes* or *no*, they don't always hear her. They look at

[my] level and don't always look at the chair level" (personal communication, April 27, 2018).

The appearance of the individual in conjunction with the AT devices can sometimes cause

discomfort and be stigmatizing. However, parent anecdotes revealed that AT allowed the public

to understand that these individuals are cognitively aware and intelligent. Adventurer's mom

mentioned, "She surprises us all the time. You don't really know somebody's intelligence or

what they're thinking about. Being able to get on these devices...she surprises us all the time!"
(personal communication, April 27, 2018). Although AT has afforded so much community
participation, there is still more progress to be made between the public and the end user.

Lastly, participants stated how they transport and utilize their AT devices when they
travel. Frenchie's mother stated, the one challenge with the Tobii Dynavox was that it is not
easily switchable between languages, this impacted Frenchie's ability to communicate with her
family and others from different countries. She mentioned that, "the other issue is that the
French, are not being able to speak French with [my family]. So if people understand English,
it's fine, but they don't, so it's limiting" (Frenchie's Mom, personal communication, April 5,
2018). She compensates by translating for Frenchie in these situations, however she wishes she
could switch between languages more easily. This isn't to say that the communication devices do
not accommodate diverse languages, but the lack of fluidity creates a barrier for individuals who
speak fluently in multiple languages.

Participants also experienced positioning and transportation barriers when they traveled
to new places. Frenchie's mother stated,

> We go to Europe to visit friends, my parents, and my family. So the issue with traveling
> is it can only be used on the power chair. Usually, when we travel, we don't use that chair
> because in Europe I don't have a van with a ramp and I cannot lift this chair. So we place
> the device on the table when we are in Europe (personal communication, April 5, 2018).

Frenchie used a manual wheelchair when traveling. However, changing out the wheelchair
prevented efficient use of her AT device as it is too heavy to mount on a manual chair.
Therefore, her mother compensated by carrying the large AT device around with them when they

traveled and then propped it up on a table for Frenchie to use. While removing the device from the mount requires Frenchie's parents to work on repositioning the device, they are still

AT Meaning

Occupational use of AT. AT enabled participation in educational engagement. For instance, the end user was capable of being on the same level as the rest of the class; they were more capable of efficiently participating in school work or home work. For example, when asked about how AT has impacted his life, Secret Texter stated, "It is way better" (personal communication, April 9, 2018). Similarly, Rose, declared, "if you have it [AT] use it" (personal communication, April 6, 2018). AT has impacted end users' lives in across multiple occupations. For instance, AT has facilitated increased communication amongst family members in order to support the personal needs of the end user. Parents were able to respond and provide for their child's needs with the use of the AT device. Secret Texter's mom commented,

> I'm learning so much more about him, and I don't have to guess what he wants. I've been completely off base sometimes with assuming he was hot or cold, but just a simple telling me what is going on with him, I can be a better mother to him (personal communication, April 9, 2018).

Parents valued being able to fulfill their role as a caregiver, and knew exactly what their child needed was essential in understanding how to care for them.

In addition to meeting their needs, end users were able to develop a deeper relationship and personal connection with other people. When referring to the impact of AT, Secret Texter's mom mentioned, "He can express his desires, needs, dreams, personalities, emotions, and he can engage socially with someone else and that's kind of what humans are about. That's what we

crave and need for life" (personal communication, April 9, 2018). She emphasized how important the AT was in enabling a voice for her child. Without the use of AT, many family members, teachers or peers would have to guess what the end users are thinking.

Having the AT device, also facilitated greater independence in expressing the end user's complex personal thoughts and supported the development of meaningful relationships. Rose's mom claimed, "[AT] means a lot because it has really helped Rose communicate with us so that she could tell us her needs, and just for her to be independent" (personal communication, April 6, 2018). The increase in communication and personal expression also facilitated the development of complex communication. Adventurer's parents also explained a similar notion,

> As people who are in her family, we probably could understand about 80 percent in what she's trying to say through just knowing her nonverbal cues, but there's always going to be something that she wants to say that requires more in depth language skills. And the iPad has allowed her to unlock that so she can let us know what she wants (personal communication, April 27, 2018).

Expressed feelings and shared complex thoughts go beyond the benefit of the end user. For example, Adventurer's teacher explained about how important the end user is as an individual besides the presence of their AT. She declared,

> If you let yourself connect with a person, I think it's really important to not let the tool become the barrier to really just see who's there. It's really easy to get distracted by the tool and be intimidated by it. And you know, at the end of the day it's about how do you let that person shine (Adventurer's Teacher, personal communication, May 15, 2018).

She expressed the importance of understanding the person behind the screen and how to efficiently use the AT in the class.

Without utilizing AT, deeper thoughts and academic skills would remain unknown and unachievable. Adventurer's teacher claimed how helpful AT was with Adventurer in her classroom. She explained,

[Adventurer's AT] is her way of communicating and it's everything to her because there's just so much that's going on in her head and in her brain. But without that device, you would never know because she doesn't have the verbal ability. We can assess the student to know where they are academically and accurately depict their grade level (Adventurer's Teacher, personal communication, May 15, 2018).

AT allowed the end user to have self-expression, and opportunity for the family to get to know the unique qualities of their child or sibling. Secret Texter's mom expressed, "The dynamic in the family has changed. His sense of humor really comes out. We all know he is funny, but when he's actually using his eye gaze to crack us up, it's a whole different thing" (personal communication, April 9, 2018). For this end user, his new access with eye gaze became the gateway for self-expression and a means to share his disposition with his family, which was previously limited. When asked about her meaning of AT, Frenchie's mom stated,

I think it increased the deepness of communication. I think it gave her a voice. She can share about something that is important, without me guessing what she has to do or where is her mind. But instead, she can share more of herself. She can initiate requests. She can joke, she can read or listen to things and participate in class (personal communication, April 5, 2018).

Frenchie's mom was able to communicate better with her daughter; she was able to know her wants and needs without guessing thus bridging the gap in communication without a verbal voice.

Discussion

All themes discovered through this qualitative study interacted together to promote greater occupational performance. However, the occupational use of AT was contingent upon the foundation of facilitators and barriers of AT. Through the identification of these barriers and facilitators, end users were able to engage in their meaningful occupations with the use of the AT features, support from their strong network (family, AT specialist, teachers), and an effective match across all contexts of their life. By successfully using their AT devices across contexts, these individuals were able to express their personalities and fully participate in their occupations.

People

AT had a positive impact on occupational performance and quality of life for the AT end users within this study. A strong network of supportive individuals facilitated the implementation of AT across various occupations and contexts. Parents described their role primarily as the one in charge of advocating to obtain the necessary AT and altering the environment in order to improve the occupational performance. Advocating included the continued upkeep required in maintaining the device over time, which included software updated and training.

The teachers within our study were considerate of the students who used AT and tried to alter their curriculum in order to enhance their engagement in the classroom. Congruent with previous research, teachers were not provided with enough information on AT use in the classroom through their formal or continuing education, or with in-service workshops (Flanagan et al., 2013). Therefore, teachers need ongoing training of the current AT in order to help improve the experiences in the classroom.

The teachers also relied on the collaboration amongst other school professionals to problem solve the end user's needs. The collaboration was described as beneficial and a hindrance in supporting the students. As described by White and Robinson (2015), co-teaching provided additional supports to the teacher and paraprofessionals. Collaboration between school personnel will be essential to continue to support AT end users in their education and facilitate the learning style that is best for them. As Adebisi and colleagues (2015) described the multidisciplinary team is a partnership between the special education teacher and the AT Specialist who ensures a functional environment for the AT user. In our study, parents expressed their appreciation for the collaboration of the team including the AT specialist.

AT end users reported high levels of independence and self-advocacy in order to obtain the support they need in using their AT device. The drive to use their AT as much as possible resulted in greater independence and maintenance of their device when an error occurred. These levels of self-motivation and drive to be independent supported their ability to be self-sufficient in directing their parents, teachers, and AT specialist. These unique perspectives of the AT end users have not been represented within current literature. AT end users are aware of their abilities and challenges, and therefore are most reliable in understanding what type of AT works best for them and what modifications need to occur.

Parents, teachers, and AT specialist, with guidance from the end users, collaborated to make the appropriate adaptations to overcome the barriers across settings and thereby enhancing occupational performance. As the PEO model describes, the occupational performance level is determined by how well the person is using the AT for their occupations (Law et al.,1996). Through the support of other people, modifications to the environment and the use of the device

resulted in a greater overlap of the three PEO concepts, and therefore increased occupational

engagement for the end users (Law & Dunbar 2007).

Match

Determining an effective AT match took time and support. Additionally, there was a

significant learning process in using a new device and customizing features to best meet

individual needs. Our participants identified the continued need for AT customization to suit

personality, and increase device efficiency to facilitate engagement in desired occupations. The

voice output of AAC / SGDs did not convey the emotionality the end user desired. For example,

it is not yet possible to yell or express sarcasm with tone of voice on a SGD. Our participants

were limited to the voices that were programmed within their devices and some felt that none of

the voices that were included provided the personalized characteristics with which they

identified. The lack of emotion behind the voice and personalization is a current gap in research

and barrier as end users were not motivated to user the AT device, decreasing their occupational

engagement.

Lastly, the type of access and required body position needed determined whether or not a

device would be ineffective or effective for the end user. Through trial and error, end users

eliminated devices that were difficult to access due to their motor limitations. This example falls

again within the PEO theoretical model as the physical abilities of the person and the need for

environmental adaptations, including position, can impact occupational engagement (Law et al,

1996).

Features

The use of eye gaze, WP, and TTS supported occupational engagement in many instances. Eye gaze was faster and more efficient than other access methods previously used for some participants, however it required high precision skills and additional environmental modifications, which sometimes created additional barriers (e.g. naturalistic conversation traveling, and the dating experience).

The use of WP features increased the efficiency in response time during conversations, which is supported by current research that states fewer keystrokes are required (Adebisi et al., 2015; White & Robertson, 2015). However, keystrokes efficiency does not take into consideration the user within context. Some of our participants reported a decrease in accuracy with the use of WP. People were left guessing what was said and sometimes the end user had to rewrite the sentences if the statement was unclear. Therefore, the lack of accuracy negated the true efficiency of the WP feature in these contexts, contradictory to current research (Adebisi et al., 2015; White & Robertson, 2015). Individuals who intend to use WP features will need to have accurate selections and spellings in order to maximize efficiency when communicating or written expression. Despite these findings, WP was not used as readily by the AT end users as expected, and incorporating these features could be expanded upon to improve efficiency.

On the other hand, TTS provided the most benefits for our end users, as it provided them with another voice option. It was a way to share their thoughts and express themselves. In addition, the TTS features were accessible on multiple devices and could be integrated into the education of end users to enhance their learning by supporting multi-sensory engagement, as stated by current research (Simpson et al., 2009). Because of the limitations with verbal

communication amongst the sample, the TTS features were life influencing and monumental through the engagement and participation in age related and social and academic activities.

Context

Facilitators and barriers to AT use existed across the three contexts identified in this research (e.g. home, school and community). Based on our results, AT allowed our end users to access their homework and school work the same way they do at school when they are at home (e.g. Google drive). In past research, parents used other techniques besides integrating their AT to modify the environment at home to meet their child's needs because they were unfamiliar with the AT device (Murchland & Parkyn, 2011). Our participants described using their AT the least within the context of home. Similar to the study by Day and Edwards (1996), non-verbal communication was utilized more than the AT device. Fewer anecdotes and stories were shared within the home setting because they had a pre-established form of communication prior to using any AT. But when the AT was used, end users were able to share complex emotions and opinions, which has not been discussed in literature, and provided more insight into the unique individuality of the end user. AT influenced the family dynamic through the enhancement of communication abilities. End users had the ability to express themselves and their personalities to their family.

In the context of school, time was a marked limitation for teachers in our sample. Teachers lacked the time and training on the use of the AT utilized by their students, and these findings were consistent with research conducted by Flanagan et al. (2013). Teachers were expected to attend workshops and make adaptations outside of the classroom, but were not provided the additional time to include into their schedules between meetings and planning for the next day. However, contradictory to Crider et al. (2014) the teachers within our study were

able to learn and adapt the curriculum through UDL to facilitate the engagement of the AT end users and their AT devices. The teachers were able to manipulate and adapt the curriculum and the classroom environment to support the participation of all students. In addition, as described in the PEO model, the support of other people, modifications to the environment, and the use of the device, allowed for greater overlap of the three PEO concepts, increasing occupational engagement (Law & Dunbar 2007).

AT opened up a variety of social and leisure occupations that these end users would otherwise not have been able to access in the community. The communities they engaged in went beyond the physical community and allowed them to partake in the virtual communities as well. Most of our end users used social media the same way as their peers, as the result of their AT. On the other hand, attempting to use AT in the community while traveling and navigating the environment was a barrier. Our findings were consistent with Murchland and Parkyn (2010) wherein the size, weight, and mounting requirements of certain AT devices created inconveniences for the end user and their family, which compromised occupational engagement in the community.

AT Meaning

Current AT research has focused on the performance skills related to specific AT features rather than occupation based and relationship factors (Day & Edwards, 1996; Murchland & Parkyn, 2011). Although we understand that AT enhances reading capabilities, spelling and organization, this study further indicated that the presence of AT greatly impacted the experience the AT end user, their families and the community across all contexts. Referring to our research question, how does AT influence the lived experiences of the end user in his or her occupations in different contexts (classroom, at home, and in the community) from the perspective of the

client, family, and school personnel, we understand that AT is much more than performance skills independent of occupation. Performance skills paired with appropriate AT enhanced deeper relationships with family, friends and those in the community through communication and socialization. AT also brought forth individual spark and personality of the end user throughout their communications, which was a gap throughout the current literature. AT has been the gateway to normalizing the lives of these end users through the ability of expressing their wants and needs. AT has enriched the lives of end users through self-expression and the sharing of complex thoughts, which has not been captured in current research. For the typical person, technology is another piece of equipment that is acquired off of the shelf, but for the AT end user, it is their voice, their access to the world; it is a part of them (IDEA, 2004).

Implications for OT Practice

Although the results of this study indicated a positive influence of AT in the end user's occupational performance, there was a lack of OT involvement in the utilization of AT amongst the participants. Occupational therapists are skilled in activity analysis, environmental modifications for optimal occupational performance, and AT falls within the scope of practice (AOTA, 2015) and thus OTs can offer specific expertise regarding AT - person match, positioning, and access methods. Utilizing the P-E-O model allows for client factor rehabilitation or compensation, environmental modifications, and occupational activity adaptations (Law & Dunbar, 2007). For example, an OT can compensate for client factors or adapt occupations in various environmental contexts with the use of AT. Therefore, OTs can and should work closely with AT end users to overcome the barriers identified within the study.

Occupational therapists must become versed and comfortable considering and using AT with clients, and should become advocating members of AT teams. AT is not a specialty area for

OT practice, and should be an addition to the OT intervention toolkit. To address this need, OT programs should include pre-service courses in AT. Therefore, AT is not only reserved as an area for advanced continuing education and certification, but is included within the foundations of the clinical curriculum. The OT community needs to advance our knowledge, consideration and support of AT because it impacts an individual's ability to engage in their occupations at home, in school and in the community.

Implementation of AT is based on the facilitators, potential challenges, and barriers described by the research participants. Occupational therapists should consider how AT may or may not benefit the end user and his or her family and community. Despite previous research indicating the benefits of device use, not every end user is appropriate for AT, and the context in which they require AT may not be appropriate. The practicing occupational therapist should consider the client as a whole, and match client factors to the environmental context and the occupations when considering best AT - person match.

Limitations

The limitations of this study affected the generalizability of results to diverse populations. All participants were limited to one county in Northern California. This study utilized a convenience sample where all participants had access to a prominent resource center and an experienced AT specialist. Our team did not have the opportunity to conduct member checks prior to this analysis. Lastly, there was a small range of diagnoses amongst the sample population. Further research is recommended to examine how AT impacts the lived experiences of individuals and their occupations in a more diverse population.

Conclusion

Through analysis of the lived experiences of AT end users, their parents, and teachers, gaps in practice can be addressed by an OTs to increase the occupational performance of end users. AT end users have been able to increase the level of occupation performance; however, they have yet to reach their full occupational engagement potential due to barriers within the environment and AT features match. Utilizing the OT perspective and PEO framework, these barriers can be addressed with OTs as members of the AT team. When facilitating the participation in occupations, OTs along with health professionals, school personnel, and AT specialist must analyze individuals' supports, context, AT match, and device features to determine how to incorporate AT effectively within the lives of end users.

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Appendix A- Interview Questions

Participant

Interview Protocol	Modified Interview Protocol
	(This interview protocol would be used for any participant who may benefit from the simplified language. NOTE: For younger participants, the interview may be conducted along with the parent / guardian present). The research team will consult with the participant's parent / guardian in advance about the semi-structured interview questions. The research team will provide the semi-structured interview questions to the parent / guardian in advance for their review and consideration. The research team will ask the parent / guardian which set of questions is best suited to the participant.
Thank you for participating in this study and sharing your experiences with us. We want to learn about Assistive Technology from your perspective and your experiences. As we go through the questions, please give us examples and share any stories related to your experiences with assistive technology.	Thank you for joining this study and sharing your stories with us. We want to learn more about the assistive technology that help you. Please give us examples and share your stories with us.
1. How has assistive technology impacted your day to day life? Please discuss both low tech and high tech.	1. How does your assistive technology help you everyday? How do you feel about getting to use your assistive technology?
2. Tell me about all of the assistive technology including software and devices that you are currently using. (device/software/features)	2. Tell me about your assistive technology. What are your favorite things about them?

3. How do you currently incorporate the AT you just described into home, school and community settings?
  a. Let's start with home, what assistive technology are you using?
    i. How do you use it?
    ii. How long have you been using that assistive technology?
    iii. What assistive technology is useful and not useful at home?
  b. How about school--what assistive technology are you using?
    i. How do you use it?
    ii. How long have you been using that assistive technology?
    iii. What assistive technology is useful and not useful at school?
  c. How about the community/socialization--what assistive technology are you using?
    i. How do you use it?
    ii. How long have you been using that assistive technology?
    iii. What assistive technology is useful and not useful in the community/to socialize?
	3. Tell me about your experiences with your assistive technology in your home, school and neighborhood.
	  a. Let's start with home, what assistive technology are you using?
	    i. How do you use it?
	    ii. How long have you been using that assistive technology?
	    iii. What assistive technology is useful and not useful at home?
	  b. How about school--what assistive technology are you using?
	    i. How do you use it?
	    ii. How long have you been using that assistive technology?
	    iii. What assistive technology is useful and not useful at school?
	  c. What assistive technology do you use in other places like stores, restaurants and with friends and family?
	    i. How do you use it?
	    ii. How long have you been using that assistive technology?
	    iii. What assistive technology is useful and not useful in the community/to socialize?

4. We want to learn about your experiences with word prediction, text to speech, speech recognition software features – are you using any of these features specifically? If so, how are you using them?	4. We want to learn about your experiences with word prediction, text to speech, speech recognition software features – are you using any of these features specifically? If so, how are you using them?
5. Tell me more about the learning process of the assistive technology you are using. (For example, was learning the assistive technology easier or more difficult than you had thought?)	5. How did you learn how to use your assistive technology? For example, was learning easy or hard?

6. Are there any other barriers that you would like to address with assistive technology?	6. Are there any other barriers that you would like to address with assistive technology?

7. How do you feel about being a person using assistive technology in everyday life?
  a. Has there been a time where you didn't want to use tech and tell me why.
	7. How do you feel about being a person using assistive technology in everyday life?
	  a. Has there been a time where you didn't want to use tech and tell me why.

8. What do you want people to know about assistive technology?	8. What to do you want people to know about assistive technology?
9. Is there anything else that you would like to share with us that we have not discussed?	9. Is there anything else you would like to share? What are your favorite things about them?
Thank you for taking the time to discuss your use of assistive technology with us. Your contributions to this study will help professionals, students, and other individuals who use assistive technology understand how it is used in different environments for different activities. We hope this knowledge will inform the public by providing streamlined ways of obtaining technology that best matches individual needs.	Thank you for taking the time to answer our questions and telling us about your assistive technology. Everything you told us will help us understand how we can help other people like you.

Parent(s)/Caregiver(s):

Thank you for participating in this study and sharing your experiences with us. We want to learn about Assistive Technology or AT from your perspective and your experiences. As we go through the questions, please give us examples and share any stories related to your experiences with AT.

1. What does assistive technology mean to you and your family?

2. Please describe the assistive technology your child is using currently using.

3. Please describe your experiences using assistive technology at:

    a. Let's start with home, what assistive technology is your child using?
        i. How long has your child been using that assistive technology?
        ii. When do you see your child using their assistive technology?
            1. How does your child use their assistive technology?
        iii. What assistive technology is useful and not useful at home?
            1. What assistive technology have you used in the past?
            2. What changes have you seen since they've used their assistive technology?
    b. How about school--what assistive technology is your child using?
        i. How long has your child been using that assistive technology?
        ii. How does your child use their assistive technology in class or for schoolwork?
        iii. Tell me about the transition from home to school of assistive technology implementation, if any.
        iv. What assistive technology is useful and not useful at school?
    c. How about the community/socialization--what assistive technology is your child using?
        i. How long has your child been using that assistive technology?
        ii. When do you see your child using their assistive technology?
            1. How does your child use their assistive technology?
        iii. What assistive technology is useful and not useful at community/socialization?
            1. What assistive technology have you used in the past?
            2. What changes have you seen since they've used their assistive technology?

4. Please tell me specifically about word prediction software, text to speech, speech recognition software features.

5. What were your initial thoughts when your child's clinician referred the use of assistive technology? What was the process of acquiring assistive technology? (Was an OT/Assistive technology specialist involved?)

6. How was the collaborative process with a team of professionals? Or other?

7. Did you have a formal introduction to your child's assistive technology?
    a. How about any formal training and follow up?
    b. Do you feel comfortable helping your child use their assistive technology?

    c. Tell me about the learning process for incorporating assistive technology into your lives.

8. What barriers with the assistive technology have you and your child experienced or are still experiencing?
    a. Logistical barriers?
    b. Emotional barriers or stigma or other?

9. What do you want other people to know about assistive technology?
    a. What would you want to share with other families who are new to assistive technology?
    b. How about education professionals?

10. Anything else you would like to share that we have not talked about?

Thank you for taking the time to discuss your child's use of assistive technology with us. Your contributions to this study will help professionals, students, and other individuals who use assistive technology understand how it is used in different environments for different activities. We hope this knowledge will inform the public by providing streamlined ways of obtaining technology that best matches individual needs.

Teachers

Thank you for participating in this study and sharing your experiences with us. We want to learn about assistive technology or assistive technology from your perspective and your experiences. As we go through the questions, please give us examples and share any stories related to your experiences with assistive technology.

1. Tell me about your experiences with assistive technology in your classroom and what having access to assistive technology means to you as an educator?

2. Can you describe the facilitators and barriers you have experienced regarding assistive technology use in your classroom teaching?
    a. Logistical barriers?
    b. Stigma barriers?

3. What type of assistive technology is currently in use? Tell me about incorporating assistive technology into lesson plans / IEPs / goals or other?

4. We want to learn specifically about word prediction software, text to speech, speech recognition software features. Tell us how this assistive technology has been part of your teaching / classroom.

5. What type of support do you have for assistive technology? Please describe the collaborative process (if applicable) between you, the family, OTs and the assistive technology professional clinicians.
   a. Tell me about your assistive technology training process. What was included in your training for assistive technology?
   b. What happens when the assistive technology is experiencing technical difficulties?

6. What do you want other people (educators, other professionals, families, students, administration) to know about assistive technology?

7. Anything else you would like to share about assistive technology that we have not talked about?

Thank you for taking the time to discuss your experience and your students use of assistive technology with us. Your contributions to this study will help professionals, students, and other individuals who use assistive technology understand how it is used in different environments for different activities. We hope this knowledge will inform the public by providing streamlined ways of obtaining technology that best matches individual needs..

Appendix B- Agency Consent

DOMINICAN UNIVERSITY of CALIFORNIA
LETTER OF PERMISSION TO AGENCY DIRECTOR

▉▉▉▉▉▉▉ips
▉▉▉▉▉▉▉, AAC/AT Specialist, Speech-Language Pathologist
▉▉▉▉▉▉▉▉▉▉▉
▉▉▉▉▉▉▉▉

Dear Mr. ▉▉▉▉▉▉▉

This letter confirms that you have been provided with a brief description of our capstone research project, which concerns factors related to the use of assistive technology across various environments, and that you give your consent for our research team to visit your facility to recruit, interview and observe a sample of your AT clients. This project is an important part of my graduate requirements as an occupational therapy capstone researcher, and is being supervised by Dr. Laura Hess PhD, OTR/L, Assistant Professor of Occupational Therapy at Dominican University of California.

As we discussed in our team meeting, I will make every effort to ensure that my data collection does not interfere with your regularly scheduled classes and workshops, and that your clients are treated with the utmost discretion and sensitivity. If you have questions about the research you may contact me at the phone number or email address below. If you have further concerns you may contact my research supervisor, Dr. Laura Hess, PhD, OTR/L, at (415) 482-1906 or the Institutional Review Board for the Protection of Human Participants at Dominican University of California by calling (415) 482-3547.

After my research project has been completed in December 2018, I will be glad to send you a summary of my research results.

If my request to visit your establishment and to interview your clients meets with your approval, please sign and date this letter below and return it to me in the enclosed self-addressed, stamped envelope as soon as possible. Please feel free to contact me if you have any questions about this project.

Thank you very much for your time and cooperation.

Sincerely,

Vhenna Fernandez, OTS, Eizelle Barrientos, OTS, Chantelle Bond, OTS, and Chelsea Golding, OTS
50 Acacia Ave.
San Rafael, CA 94901
Email address: [Vhenna.Fernandez@sudents.dominican.edu]
(916) 346-5023

I agree with the above request

▉▉▉▉▉▉▉▉▉▉▉▉ 1/19/18
Signature   Date

Appendix C- Research Participant's Bill of Rights

DOMINICAN UNIVERSITY OF CALIFORNIA

Every person who is asked to be in a research study has the following rights:

1. To be told what the study is trying to find out;

2. To be told what will happen in the study and whether any of the procedures, drugs or devices are different from what would be used in standard practice;

3. To be told about important risks, side effects or discomforts of the things that will happen to

her/him;

4. To be told if s/he can expect any benefit from participating and, if so, what the benefits might be;

5. To be told what other choices s/he has and how they may be better or worse than being in the study;

6. To be allowed to ask any questions concerning the study both before agreeing to be involved and during the course of the study;

7. To be told what sort of medical treatment is available if any complications arise;

8. To refuse to participate at all before or after the study is stated without any adverse effects. If such a decision is made, it will not affect h/her rights to receive the care or privileges expected if s/he were not in the study.

9. To receive a copy of the signed and dated consent form;

10. To be free of pressure when considering whether s/he wishes to be in the study.

If you have questions about the research you may contact me at (Vhernna.Fernandez@students.dominican.edu). If you have further questions you may contact my research supervisor, (Dr. Laura Hess, PhD, OTR/L (415) 482-1906) or the Dominican University of California Institutional Review Board for the Protection of Human Participants (IRBPHP), which is concerned with protection of volunteers in research projects. You may reach the IRBPHP Office by calling (415) 482-3547 and leaving a voicemail message, or FAX at (415) 257-0165, or by writing to IRBPHP, Office of Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901

Appendix D- Letter of Introduction to Participants in Research Study

LETTER OF INTRODUCTION TO PARTICIPANTS

IN RESEARCH STUDY

Dear ████████████

 Our names are Eizelle Barrientos, Chantelle Bond, Vhernna Fernandez, and Chelsea Golding and we are occupational therapy graduate students at Dominican University of California. We are conducting a capstone project as part of our program requirements, and this work is being supervised by Dr. Laura Hess, PhD, OTR/L, assistant professor of occupational therapy at Dominican University of California. We are requesting your approval to include your clients from the ███████████████████████ in our research study, which concerns individuals' lived experience using assistive technology devices featuring text to speech, word prediction, and speech recognition.

 Participation in this study requires the individuals to complete a semi-structured interview with researchers, and researchers will observe them engaging in their natural environments using personal AT software. These observations may take place in different locations depending on the participant and their daily routines (e.g. school, home, community). Audio and/or video recording of the sessions will be used to record data and for analysis purposes. Additionally, participation of the parents/caregivers and teachers will involve completing a separate, audio and/or video recorded, semi-structured interview with the researchers. Please note that your clients' participation is **completely voluntary** and they are **free to withdraw their participation at any time.** In addition, all interviews and recordings will be coded with subject numbers and pseudonyms to protect **anonymity**. Anonymity cannot be guaranteed, however, and in the unlikely event an identity becomes known, all information will be held as completely confidential.

 If your clients choose to participate in this study, please sign the attached proxy form. You may then return them to us at your earliest convenience in the envelope provided via the Occupational Therapy Student researchers by January 19, 2018.

 If you have questions about the research you may contact us at the email address below. If you have further questions you may contact my research supervisor, (Dr. Laura Hess PhD, OTR/L (415) 482-1906) or the Dominican University of California Institutional Review Board for the Protection of Human Participants (IRBPHP), which is concerned with protection of volunteers in research projects. You may reach the IRBPHP Office by calling (415) 482-3547 and leaving a voicemail message, or FAX at (415) 257-0165, or by writing to IRBPHP, Office of Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901.

 If you would like to know the results of this study once it has been completed, a summary of the results will be presented at Dominican University of California's Academic Showcase in December, 2018. Please contact us at the email address below for further information.

Thank you in advance for your participation.

Sincerely,

Vhernna Fernandez

Occupational Therapy Department

Dominican University of California

50 Acacia Avenue

San Rafael, CA 94901

Email address: vhernna.fernandez@students.dominican.edu

Appendix E - Participant Consent Form

DOMINICAN UNIVERSITY OF CALIFORNIA

CONSENT FORM TO BE A RESEARCH PARTICIPANT

1. I understand that I am being asked to participate in a study on the use of assistive technology and personal perspectives of the end user, families and service providers. The researchers want to learn more about the use of AT and features including text to speech, word prediction and speech recognition, and how these AT applications facilitate engagement in daily occupations. This research is part of capstone research project at Dominican University of California, California. This research project is being supervised by (Dr. Laura Hess, PhD, OTR/L), Assistant Professor at Dominican University of California.

2. I understand that participation in this research will involve taking part in:

    a. Approximately 30-60 minute face-to-face interview focusing on personal views about assistive technology (AT)
    b. Audio and/or video samples of your use of AT in various contexts (e.g. home, school, community) wherein the researchers will join you at a time of your convenience to obtain the video of AT in use in your daily life.
    c. Sharing my records related to AT including IEPs and AT evaluations

3. I understand that my participation in this study is completely voluntary and I am free to withdraw my participation at any time.

4. I have been made aware that the interviews will be audio and/or video recorded. All personal references and identifying information will be eliminated when these recordings are transcribed, and all Participants will be identified by numerical code only; the master list for these codes will be kept by researchers in a locked file, separate from the transcripts. Coded transcripts will be seen only by the researchers and their faculty advisors. One year after the completion of the research, all written and recorded materials will be destroyed.

5. I am aware that all study participants will be provided with a written summary of the relevant findings and conclusions of this project. Such results will not be available until after December, 2018.

6. I understand that I will be discussing topics of a personal nature and that I may refuse to answer any question that causes me distress or seems an invasion of my privacy. I may elect to stop the interview at any time. I may elect to not have my interview video recorded, and may opt for audio recording only.

7. I understand that my participation involves no physical risk, but may involve some psychological discomfort, given the nature of the topic being addressed in the interview. If I experience any problems or serious distress due to my participation, I can ask for a break, and/or I can ask for that portion of the research to stop. I can also withdraw from the study at any time.

8. I understand that if I have any further questions about the study, I may contact Ms. Vhernna Fernandez at [Vhernna.Fernandez@students.dominican.edu], Eizelle Barrientos

[Eizelle.Barrientos@students.dominican.edu], Chantelle Bond[Chantelle.Bond@students.dominican.edu], Chelsea Golding [Chelsea.Golding@students.dominican.edu] or the research supervisor, [Dr. Laura Hess, PhD, OTR/L, (415) 482-1906]. If I have further questions or comments about participation in this study, I may contact the Dominican University of California Institutional Review Board for the Protection of Human Participants (IRBPHP), which is concerned with the protection of volunteers in research projects. I may reach the IRBPHP Office by calling (415) 482-3547 and leaving a voicemail message, by FAX at (415) 257-0165, or by writing to the IRBPHP, Office of the Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901.

9. All procedures related to this research project have been satisfactorily explained to me prior to my voluntary election to participate.

I HAVE READ AND UNDERSTAND ALL OF THE ABOVE EXPLANATION REGARDING THIS STUDY. I VOLUNTARILY GIVE MY CONSENT TO PARTICIPATE. A COPY OF THIS FORM HAS BEEN GIVEN TO ME FOR MY FUTURE REFERENCE.

_____

Name

_____   _____

Signature   Date

Appendix F - Parent/Teacher Participant Consent Form

DOMINICAN UNIVERSITY OF CALIFORNIA
CONSENT FORM TO BE A RESEARCH PARTICIPANT

1. I understand that I am being asked to participate in a study on the use of assistive technology and personal perspectives of the end user, families and service providers. The researchers want to learn more about the use of AT and features including text to speech, word prediction and speech recognition, and how these AT applications facilitate engagement in daily occupations. This research is part of capstone research project at Dominican University of California, California. This research project is being supervised by (Dr. Laura Hess, PhD, OTR/L), Assistant Professor at Dominican University of California.

2. I understand that participation in this research will involve taking part in:
    a. Approximately 30-60 minute face-to-face interview focusing on personal views about assistive technology (AT)
    b. Audio and/or video samples of your use of AT in various contexts (e.g. home, school, community) wherein the researchers will join you at a time of your convenience to obtain the video of AT in use in your daily life.

3. I understand that my participation in this study is completely voluntary and I am free to withdraw my participation at any time.

4. I have been made aware that the interviews will be audio and/or video recorded. All personal references and identifying information will be eliminated when these recordings are transcribed, and all Participants will be identified by numerical code only; the master list for these codes will be kept by researchers in a locked file, separate from the transcripts. Coded transcripts will be seen only by the researchers and their faculty advisors. One year after the completion of the research, all written and recorded materials will be destroyed.

5. I am aware that all study participants will be provided with a written summary of the relevant findings and conclusions of this project. Such results will not be available until after December, 2018.

6. I understand that I will be discussing topics of a personal nature and that I may refuse to answer any question that causes me distress or seems an invasion of my privacy. I may elect to stop the interview or session at any time. I may elect to not have my interview or session video recorded, and may opt for audio recording only.

7. I understand that my participation involves no physical risk, but may involve some psychological discomfort, given the nature of the topic being addressed in the interview. If I experience any problems or serious distress due to my participation, I can ask for a break, and / or I can ask for that portion of the research to stop. I can also withdraw from the study at any time.

8. I understand that if I have any further questions about the study, I may contact Ms. Vhernna Fernandez at [Vhernna.Fernandez@students.dominican.edu], Eizelle Barrientos

[Eizelle.Barrientos@students.dominican.edu], Chantelle Bond
[Chantelle.Bond@students.dominican.edu], Chelsea Golding
[Chelsea.Golding@students.dominican.edu] or the research supervisor, [Dr. Laura Hess, PhD, OTR/L, (415) 482-1906]. If I have further questions or comments about participation in this study, I may contact the Dominican University of California Institutional Review Board for the Protection of Human Participants (IRBPHP), which is concerned with the protection of volunteers in research projects. I may reach the IRBPHP Office by calling (415) 482-3547 and leaving a voicemail message, by FAX at (415) 257-0165, or by writing to the IRBPHP, Office of the Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901.

9. All procedures related to this research project have been satisfactorily explained to me prior to my voluntary election to participate.

I HAVE READ AND UNDERSTAND ALL OF THE ABOVE EXPLANATION REGARDING THIS STUDY. I VOLUNTARILY GIVE MY CONSENT TO PARTICIPATE. A COPY OF THIS FORM HAS BEEN GIVEN TO ME FOR MY FUTURE REFERENCE.

Name

Signature   Date

Appendix G - Proxy Consent Form

DOMINICAN UNIVERSITY of CALIFORNIA
PROXY CONSENT FOR RESEARCH PARTICIPATION

Purpose and Background
Ms. Eizelle Barrientos, Chantelle Bond, Vhernna Fernandez, Chelsea Golding, graduate students, and Dr. Laura Hess, PhD, OTR/L, assistant professor, Department of Occupational Therapy at Dominican University of California, are doing a study on the use of assistive technology and personal perspectives of the end user, families and service providers. We want to learn more about the use of AT and features including text to speech, word prediction and speech recognition, and how these AT applications facilitate engagement in daily occupations.

My child is being asked to participate because s/he uses AT to facilitate their learning and to engage in their occupations.

Procedures
If I agree to allow my child to be in this study, the following will happen:
1. My child will complete a semi-structured interview about their perspective on how they use assistive technology software and observed how they use/integrate assistive technology in various settings, such as home, school, and the community. I may join my child during this interview per my discretion and/or my child's request.
2. My child will be audio and/or video recorded during their interview and in their natural environment while using their AT.
3. The researchers may review my child's education records including IEP records, AT evaluations and other pertinent documents to obtain information about the nature and extent of AT use in everyday life.

Risks and/or discomforts
1. My child may feel uncomfortable or upset while being audio and/or video recorded during the semi-structured interview or naturalistic observations.
2. My child or I may feel uncomfortable discussing sensitive and personal information.
3. My child or I may feel uncomfortable with researchers reviewing records and personal history.
4. Study records will be kept as confidential as is possible. No individual identities will be used in any reports or publications resulting from the study. All personal references and identifying information will be eliminated when the data are transcribed, and all Participants will be identified by numerical code / pseudonym only, thereby ensuring confidentiality regarding the participant's responses. The master list for these codes will be kept by the Dominican University occupational therapy department in a locked file, on a password protected desktop computer in a locked faculty office, separate from the transcripts. Only the researchers and her faculty advisors will see coded transcripts. One year after the completion of the research, all written and recorded materials will be destroyed.

Benefits
Participants may feel a sense of satisfaction and pride in telling their AT story from their point of view. The consumers and families may feel that they are contributing to the literature by

participating in this project and their participation can lead to better awareness and AT implementation.

Costs/Financial Considerations
There are no financial costs for participants. Participants are asked to volunteer their time and additional effort to participate in our study in conjunction with their other daily obligations (e.g. school, work, extracurricular activities). Transportation may be required depending on participant availability and environment, however, the intention is for the research team to go to the participants in their settings.

Payment/Reimbursement
Neither my child nor I will be reimbursed for participation in this study.

Questions
I have talked to a researcher about this study and have had my questions answered. If I have further questions about the study, I may call Vhernna Fernandez (916) 346-5023 or Dr. Laura Hess, Ph. D, OTR/L (415) 482-1906. If I have any questions or comments about participation in this study, I should first talk with the researchers. If for some reason I do not wish to do this, I may contact the Dominican University of California Institutional Review Board for the Protection of Human Participants (IRBPHP), which is concerned with protection of volunteers in research projects. I may reach the IRBPHP Office by calling (415) 482-3547 and leaving a voicemail message, or FAX at (415) 257-0165, or by writing to IRBPHP, Office of Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901.

Consent
I will receive a copy of this consent form, signed and dated, to keep via mail, email, or in person.

PARTICIPATION IN RESEARCH IS VOLUNTARY. I am free to decline to have my child be in this study, or to withdraw my child from it at any point. My decision as to whether or not to have my child participate in this study will have no influence on my child's present or future status as a patient in my pediatrician's office.

My signature below indicates that I agree to allow my child to participate in this study.

_____

Name of Participant's Parent/Guardian

_____

Signature of Participant's Parent/Guardian   Date

_____

Signature of Person Obtaining Consent   Date

_____

Signature of Person Obtaining Consent   Date

_____
Signature of Person Obtaining Consent   Date

_____
Signature of Person Obtaining Consent   Date

_____
Signature of Supervisor Obtaining Consent   Date

Appendix H - Child Assent Form

DOMINICAN UNIVERSITY of CALIFORNIA
ASSENT TO PARTICIPATE IN RESEARCH – Children ages 7-12
Assistive Technology and the Impact on Occupations

1. My name is Eizelle Barrientos, Chantelle Bond, Vhernna Fernandez, and Chelsea Golding.

2. We are asking you to take part in a research study because we are trying to learn more about how you use assistive technology to help you with different activities in different places.

3. If you agree to be in this study you will answer questions, your voice and/or video will be recorded. You will show us how you use your assistive technology at home, school, or in your favorite places.

4. Sometimes the questions we will ask may make you feel nervous or upset. You might also feel nervous or shy when your voice is recorded or we are video recording what you are doing. We will also look at your school records. Everything that we learn about you and what you show us will be kept as private as possible.

5. After completing our project and learning about you, your story can help us understand how to use AT better in everyday life. This will give us more ideas on how to help others who use AT.

6. Please talk this over with your parents before you decide whether or not to participate. We will also ask your parents to give their permission for you to take part in this study, but even if your parents say "yes" you can still decide not to do this.

7. If you don't want to be in this study, you don't have to participate. Remember, being in this study is up to you and no one will be upset if you don't want to participate or even if you change your mind later and want to stop.

8. You can ask any questions that you have about the study. If you have a question later that you didn't think of now, you can call Vhernna Fernandez [(916) 346-5023] or ask her next time.

9. Signing your name at the bottom means that you agree to be in this study. You and your parents will be given a copy of this form after you have signed it.

_____   _____
Name / Signature   Date

_____   _____
Guardian / Witness   Date

Appendix I - Adolescent Assent Form

DOMINICAN UNIVERSITY of CALIFORNIA
ADOLESCENT (Ages 13-17) ASSENT TO PARTICIPATE IN RESEARCH

Assistive Technology and the Impacts of Occupations

You are being asked to participate in a research study conducted by Eizelle Barrientos, Chantelle Bond, Vhernna Fernandez, Chelsea Golding, and faculty advisor Dr. Laura Hess, PhD, OTR/L, assistant professor, at Department of Occupational Therapy

███
███████████████████████

Why is this study being done?

We want to learn more about the use of assistive technology (AT) and features including text to speech, word prediction and speech recognition, and how these AT applications help people participate in everyday activities.

What will happen if I take part in this research study?

We are asking you to take part in a research study because we are trying to learn more about how you use AT to help you with different activities in different places.

Please talk this over with your parents before you decide whether or not to participate. We will also ask your parents to give their permission for you to take part in this study. But even if your parents say "yes" you can still decide not to do this.

If you volunteer to participate in this study, the researcher will ask you to do the following:
-   You will be asked questions about how you use your AT.
-   You will demonstrate how to use your AT in your home, school and favorite places.
-   You will be audio and/or video recorded throughout your involvement in this study.
-   You will be asked to share your records including school IEPs and AT evaluations and other documents pertinent to your AT use.

How long will I be in the research study?

Researchers and participants will schedule various meetings for about an hour for a duration of 2-3 months or until interviews and observations have been completed.

Are there any potential risks or discomforts that I can expect from this study?

You may feel uncomfortable or upset while being audio and/or video recorded during the semi-structured interview or naturalistic observations. You may also, feel uncomfortable discussing sensitive and personal information. And you may feel uncomfortable with researchers reviewing records and personal history.

Are there any potential benefits if I participate?

You will not directly benefit from your participation in the research. However, research participants may feel that they are contributing to the AT community and important research when they volunteer to participate in research studies. Often, research participants who get an opportunity to share their personal stories experience a sense of contribution to a cause that is important to them personally.

After completing our project and learning about you, your story can help us understand how to use AT better in everyday life. This will give us more ideas on how to help others who use AT.

Will I receive any payment if I participate in this study?

You will receive no payment for your participation.

Will information about me and my participation be kept confidential?

Any information that is collected in connection with this study and any information that identifies you will remain confidential. Your information will only be disclosed with your permission or as required by law. Your privacy will be maintained by having your study records kept as confidential as is possible. Your identity will not be used in any reports or publications after the study is completed.

All personal information will be removed when the data is transcribed, and your identity will be replaced with a number code only, which assures confidentiality connecting to your responses. The master list for the codes will be kept by the Dominican University occupational therapy department in a locked file, on a password protected desktop computer in a locked faculty office, separate from the transcripts. Only the researchers and their faculty advisors will see coded transcripts. One year after the completion of the research, all written and recorded materials will be destroyed.

What are my rights if I take part in this study?

You may withdraw your assent at any time and discontinue participation without penalty or loss of benefits to which you were otherwise entitled.

You can choose whether or not you want to be in this study. If you volunteer to be in this study, you may leave the study at any time without consequences of any kind. You are not waiving any of your legal rights if you choose to be in this research study. You may refuse to answer any questions that you do not want to answer and still remain in the study.

Who can answer questions I might have about this study?

In the event of a research related injury, please immediately contact one of the researchers listed below. If you have any questions, comments or concerns about the research, you can talk to the

one of the researchers or research supervisor. Please contact Vhernna Fernandez at (916) 346-5023 or Dr. Laura Hess, PhD, OTR/L (415) 482-1906.

If you have questions about your rights as a research subject, or you have concerns or suggestions and you want to talk to someone other than the researchers, you may reach the IRBPHP Office by calling (415) 482-3547 and leaving a voicemail message, or FAX at (415) 257-0165, or by writing to IRBPHP, Office of Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901.

SIGNATURE OF STUDY PARTICIPANT

I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____

Name of Participant

_____   _____

Signature of Participant   Date

SIGNATURE OF PERSON OBTAINING ASSENT

In my judgment the participant is voluntarily and knowingly agreeing to participate in this research study.

_____   _____

Name of Person Obtaining Assent   Contact Number

_____   _____

Signature of Person Obtaining Assent   Date

Appendix J - Media Consent Form

Media Consent Form

I, _____, agree to be
photographed, videotaped, or audio recorded by occupational therapy graduate student
researchers at Dominican University of California.

I fully understand and agree that any statements I make or any photographs taken of me
may be displayed in public places, duplicated, distributed and/or published by Dominican
University of California in a manner including, but not limited, to the following:

[ ] Photographic display
[ ] Audio recording
[ ] Video tape
[ ] Internet
[ ] Website

I release Dominican University of California and their officers, agents, employees,
volunteers and/or students from any and all claims that might arise from use of such statements
and/or photographs.

Signature_____
(Signature of participant)

Signature_____
(Signature of parent/legal guardian is required for minors to participate.)

Date_____

Appendix K - Research Assistant Consent Form

Confidentiality Agreement for Human Subject Research Assistants

Human subject research includes confidential and personal matters, some of which may involve a subject's rights of privacy protected by law, attorney-client privileged communications, and proprietary information. I agree to maintain confidentiality with respect to any private or personal information that I become aware of, or have access to, during the course of my activity as a researcher or research assistant. In providing support to a research project, I am considered a "confidential employee." I am prohibited from releasing information to or discussing information with anyone not employed in this specific research project, except as I am directed by the faculty advisor or as is necessary in the ordinary course of performing my duties in the research activity.

I agree to maintain confidentiality of these matters while I am working on the research project and following the completion of my work association on this activity.

At all times during my participation, I shall promptly advise the primary investigator and faculty advisor of any knowledge that I may have of any unauthorized release or use of confidential or personal information, and shall take reasonable measures to prevent unauthorized persons from having access to, obtaining, or being furnished with any such information.

Print Name: _____

_____   _____
Signature: _____   Date: _____

The policies were explained to me by:

_____   _____
Name _____   Title_____

Appendix L - Recruitment Flyer

Research Participation Opportunity!
Assistive Technology and the Impact on Occupations

Occupational therapists (OT) employ Assistive Technology (AT) strategies to promote engagement in occupations (meaningful activities at home, school and in your community). Current research has focused on the productivity of AT, yet there has been a lack of attention to the client's perspective about their experience with AT. The purpose of this research is to examine AT in naturalistic contexts (e.g. home, school, community) from the perspective of the client, family and other key players in their lives such as teachers. This research will use semi-structured interviews, naturalistic observations and a review of records, focusing on the lived experiences of individuals who are currently using AT.

Who can participate?
- Individuals who have been using AT for at least 1 year and are over 7 years old.
- Parents / guardians and Teachers of AT consumers.

What is involved in the study?
- Semi-structured interviews that will be video and audio recorded (approximately 30-60 minutes).
- Video and audio recordings of the use of AT in naturalistic contexts (e.g., home, school & community).
- Sharing of pertinent AT documents including IEPs and AT evaluations.
- Participation is completely voluntary and there is no compensation.

If interested, please contact:
Vhernna Fernandez, OTS,
(vhernna.fernandez@students.dominican.edu), (916) 346-5023
Dr. Laura Hess, PhD, OTR/L
(laura.hess@dominican.edu), (415) 482-1906

50 Acacia Ave, San Rafael, California 94901 - 2298 • *p.* 415-457-4400
www.dominican.edu