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Technology Supports for Individuals with Disabilities in New York State: A Survey of Current Status

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Abstract

This exploratory study examines the current use of instructional technology, and assistive technologies for support of individuals with learning disabilities as well as other disabilities in New York State.

The researchers used SurveyMonkey and postings on social media websites for various professional organizations to solicit responses to a questionnaire from individuals working with or caring for persons with disabilities. A small sample of responses (N=122) revealed barriers to the use of technology, as well as the preferred type and most convenient for persons with disabilities. School districts may want to use this survey with students, parents and community members.

Introduction

There is a rich history of the use of technology to support individuals with learning and other disabilities. Blackhurst (2005) described six specific types of technology impacting education, including the technology of teaching; instructional, assistive, and medical technology; productivity tools; and information technologies. Various forms of technology may be used in different ways. For example, the technology of teaching includes specific approaches such as direct instruction and applied behavior analysis. Instructional technology, defined as tools for the delivery of instruction, include computer-based instructional strategies like electronic books and use of the internet. Similarly, information technology provides access to knowledge and resources. Technology productivity tools include devices, software, and applications to help people work more efficiently and effectively. Assistive and medical technology incorporates specially-designed tools that may be used to help people with disabilities and medical issues to function, and even to stay alive in their current environments (Blackhurst, 2005).

Despite a thorough discussion of the various ways in which technology can impact those with disabilities, Blackhurst (2005) did not specifically address consumer technology as a source of potential supports. There have been recent significant advancements in the portability, usability, and affordability of consumer technology that have

greatly changed the landscape of technology supports available. A more recent look at technology trends in the education and support of people with disabilities reflects this updated perspective by looking specifically at the use of mobile devices. Newton and Dell (2011) describe mobile devices as having many advantages, including being appealing and relatively inexpensive. Additionally, modern consumer mobile devices such as tablets and smartphones are familiar to both teachers/support staff and students and are often fairly user-friendly and intuitive.

Stephenson and Limbrick (2015) offered evidence to support the use of touch-screen mobile devices (TSMDs) by people with disabilities. They found that the operation of TSMDs was not difficult for people with developmental disabilities, but that the use of various apps (software applications) appeared to present challenges. The cost of ownership of TSMDs was shown to be relative in terms of the potential benefits. They suggested that future research should explore the use of TSMDs for supporting independence, communication, and leisure for individuals with disabilities.

Although Blackhurst (2005), Newton and Dell (2011), and Stephenson and Limbrick (2015) provide good descriptions of types of technology that may be used to support individuals with disabilities, along with their benefits and drawbacks, they do not report on how these tools are actually being used. Okolo and Diedrich (2014) attempted to answer this question by conducting a statewide study of teacher knowledge and use of assistive technology. They found a surprisingly low incidence of use of technology, with several possible supporting factors. One finding was that students and parents were minimally involved in technology selection and use. According to the authors, students and parents were not viewed by teachers as critical to decision-making about the uses of technology. Additionally, teachers reported knowing little about the use of technology at home for their students. This likely indicates a further lack of cooperation and collaboration between families and schools on this issue (Okolo & Diedrich, 2014).

While there is a well-documented history of research showing that technology has been successfully used to support individuals with disabilities, barriers preventing technology availability and use continue to exist. Tanis (2012) presents evidence that there is increased use of readily-available consumer technology, such as computers, by individuals with disabilities, but difficulties with implementation continue to be observed. The most frequently reported barriers for any given device were cost, assessment, and information. Device users reported that they needed assistance in using a device and training on how to use their device. Devices would be underutilized, or not used at all, if support for technology was not comprehensive, systemic, and inclusive. Results of the Tanis study (2012) show that cost and training continue to present barriers to utilization.

The purpose of this study was to investigate how currently available technology is being used to support individuals with disabilities in New York State.

Method

Participants and Procedures

The target population is individuals having a disability, or those having a personal or professional relationship with a person with a disability. This population includes a broad cross section of Grades K-12 general and special education teachers, related service

personnel, administrators, technology coordinators, parents, guardians, and caregivers of individuals with disabilities, and individuals with disabilities.

The researchers distributed the recruitment information via various social media outlets of professional organizations and centers (i.e., New York State Association for Behavior Analysis, New York State Speech-Language Hearing Association).

A 15-question online survey was administered via SurveyMonkey between June 1, 2016 and September 1, 2016. This setting prevented the collection of IP addresses from respondents. There were no internet location (IP) addresses collected and the survey did not ask for any personal or otherwise identifying information from respondents.

122 participants completed the required survey questions. Some survey questions were not applicable to some participants. Table 1 shows how participant characteristics were represented across the respondents.

Data Analysis

Research Question #1: What is the current status in New York State regarding ownership of electronic devices and technology supporting individuals with disabilities?

Table 1.		
<i>Participants' characteristics</i>		
Characteristics	N	Percent
Nature of the disability(N=122)		
Cognitive or intellectual	57	46.27
Developmental	83	68.03
Physical	16	13.11
Other	11	9.02
Status (N=122)		
Self	11	9.02
Parent or caregiver	41	33.61
Professional	61	50.00
Other	9	7.38
Geographic region (N=65)		
Adirondacks	3	4.62
Western	2	3.08
Finger Lakes	1	1.54
Central	7	10.70
Capital District	5	7.69
Catskills	4	6.15
Metro NYC and Long Island	40	61.54
Lower Hudson Valley	3	4.62
Environmental setting (N=121)		
Pre-school	12	9.92
Elementary school	29	29.97
Middle school	17	14.05
High school	18	14.88
Vocational training	7	5.79
Higher education	7	5.79
Supported employment	2	1.65
Competitive employment	3	2.48
Day program	10	8.26
Other	16	13.22

Table 2. Ownership of electronic devices and technologies.		
Ownership	N	Percent
Electronic devices(N=121)		
Yes	74	61.16
No	47	38.84
Technologies (N=57)		
Personal purchase	36	63.16
Covered by medical insurance	6	10.53
Provided by government agency	4	7.02
Provided by school or service agency	20	35.09
Provided by school district	14	24.56
Gift or donation	6	10.53
Other	1	1.75

As shown in Table 2, over 60% of the participants owned electronic devices and purchased the related technologies by themselves. In the meantime, many participants also reported that technologies were provided by school or service agency (35.09%) and school district (24.56%). However, only 57 participants reported their ownership of technologies. The low response rate should be addressed in the future research design.

Research Question #2: What is the current status of the participants regarding the usage of electronic devices and technology supporting individuals with a disability?

Participants were asked to choose as many purposes as they used each of several types of devices to support themselves or another individual with a disability. There was a total of 191 responses across seven possible uses of technology. Most of the reported uses were for educational (N=39, 20.42%), leisure (N=37, 19.37%), communication (N= 34, 17.8%), and socialization (N= 34, 17.8%) purposes.

The type of device in most common usage across all categories of use was by far the tablet, ranging from 86.49% of leisure uses (N=32) to 42.86% of "other" uses (N=3). These results are illustrated in Figure 1.

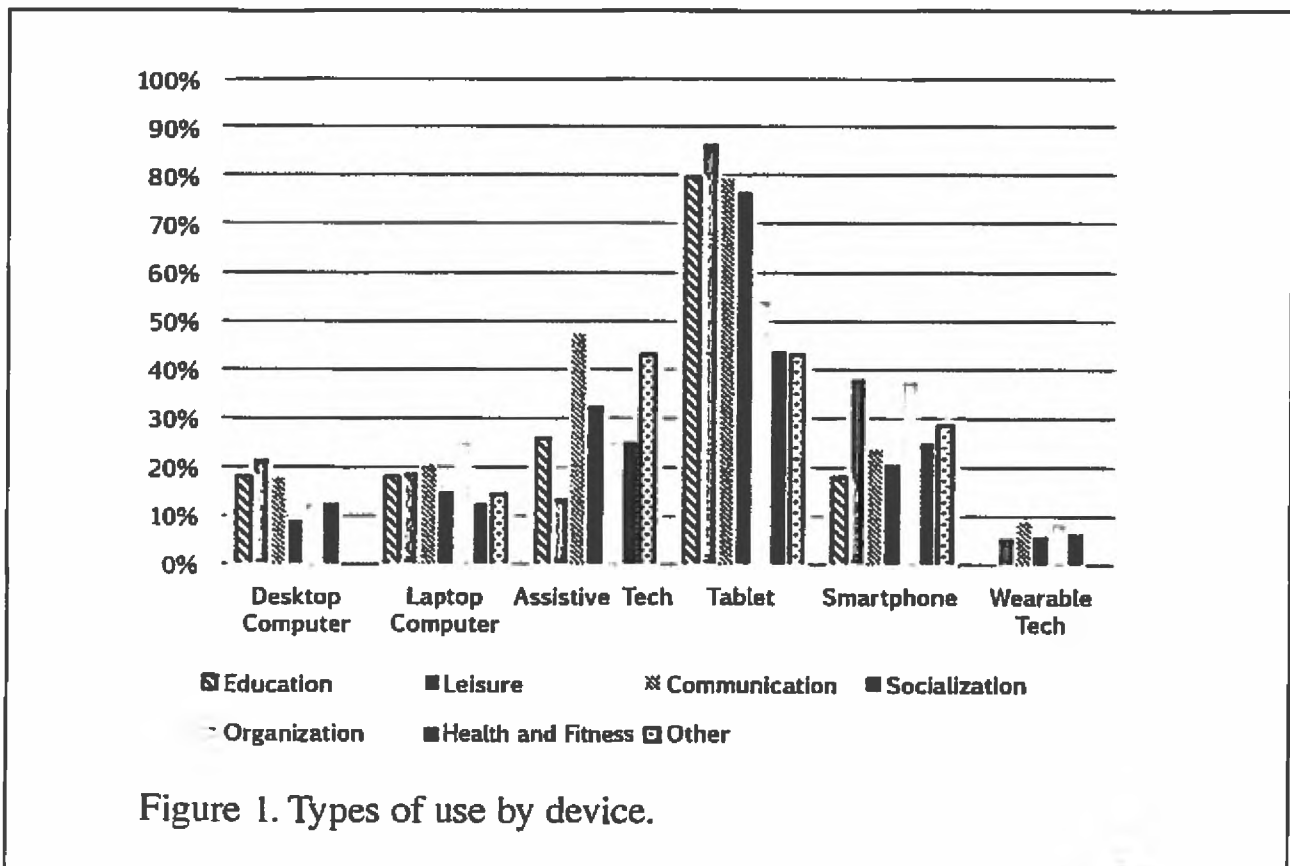


Figure 1. Types of use by device.

Smartphones and assistive technology were reported to be used second-most frequently for all purposes. Smartphones were reportedly used for 37.84% of leisure uses (N=14), 37.5% of organization uses (N=9), and 25% of health and fitness uses (N=4). Assistive technology devices were reportedly used for 25.64% of education uses (N=10), 47.06% of communication uses (N=16), 32.35% of socialization uses (N=4), 25% of health and fitness uses (N=4), and 42.86% of "other" uses (N=3). Wearable technology was reported to be used the least of all devices, with only a few responses indicating use for leisure (5.41%, N=2), communication (8.82%, N=3), socialization (5.88%, N=2), organization (8.33%, N=2), and health and fitness (6.25%, N=1).

Participants also were asked to report the "top three" apps in use across portable forms of technology, including tablets, smartphones, and wearable technology. These qualitative answers were analyzed by grouping apps according to the category listed for each in iTunes and are illustrated in Figure 2. Due to a very low response rate for apps for wearable technology (three answers were given, only one of which was found in iTunes as an app), only responses for apps used with tablets and smartphones were analyzed.

The majority of the apps reported (53.06%, N=26) fell into the category of Education, according to iTunes. 73.08% (N=19) of Educational apps were reported as used on tablets, and 26.92% (N=7) of Educational apps were

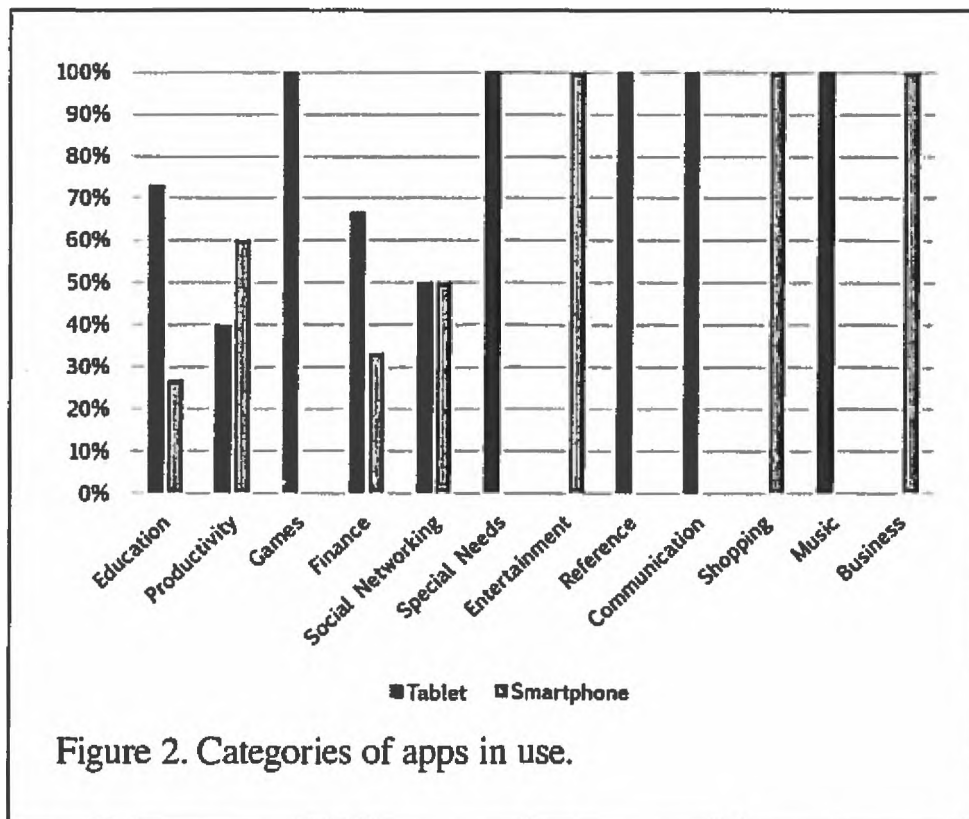
reported as used on smartphones. The next largest category of apps was Productivity, with 10.2% (N=5) of the apps reported falling into this category. 40% (N=2) of Productivity apps reported were for tablets, and 60% (N=3) were for smartphones. All apps categorized as Games were reported for use on tablets, but only 8.16% (N=4) of apps fell into this category.

Other categories of apps that were reported less frequently included Finance (6.12% of all apps, N=3), Social Networking, Special Needs, and Entertainment (4.08% each of all apps, N=2 each), and Reference, Communication, Shopping, Music, and Business (2.04% each of all apps, N=1 each). Distribution of apps across these lower-frequency categories is probably not meaningful due to very low numbers of responses. Overall, 14 apps were recorded 3 or fewer times in 9 categories. 57.14% (N=8) of these were reported for tablet use, and 42.86% (N=6) were reported for smartphone use.

Research Question #3: What forms of technology and for what purposes is technology desired to support individuals with disabilities?

Participants were asked to choose types of devices desired for each purpose to support themselves or another individual with a disability. There was a total of 106 responses across seven possible desired uses of technology. The type of device desired overall across all categories of use was by far the smartphone, ranging from

86.67% for leisure use (N=13) to 38.89% for organization (N=7) as illustrated in Figure 3. Tablets and wearable technology were reported to be the second-most often desired types of devices for all categories of use. Tablets were reported to be desired for educational (N=8, 47.06%), communication (N=6, 35.29%), socialization (N=5, 29.41%), organization (N=5, 27.78%), leisure (N=4, 26.67%), and health and fitness (N=3, 17.65%) purposes. Wearable technology was reported to be desired for health and fitness (N=8, 47.06%), socialization (N=7, 41.18%), communication (N=6, 35.29%), education (N=6, 35.29%), and leisure (N=5, 33.33%). Low response rates were noted for desktop computers and assistive technology across all categories



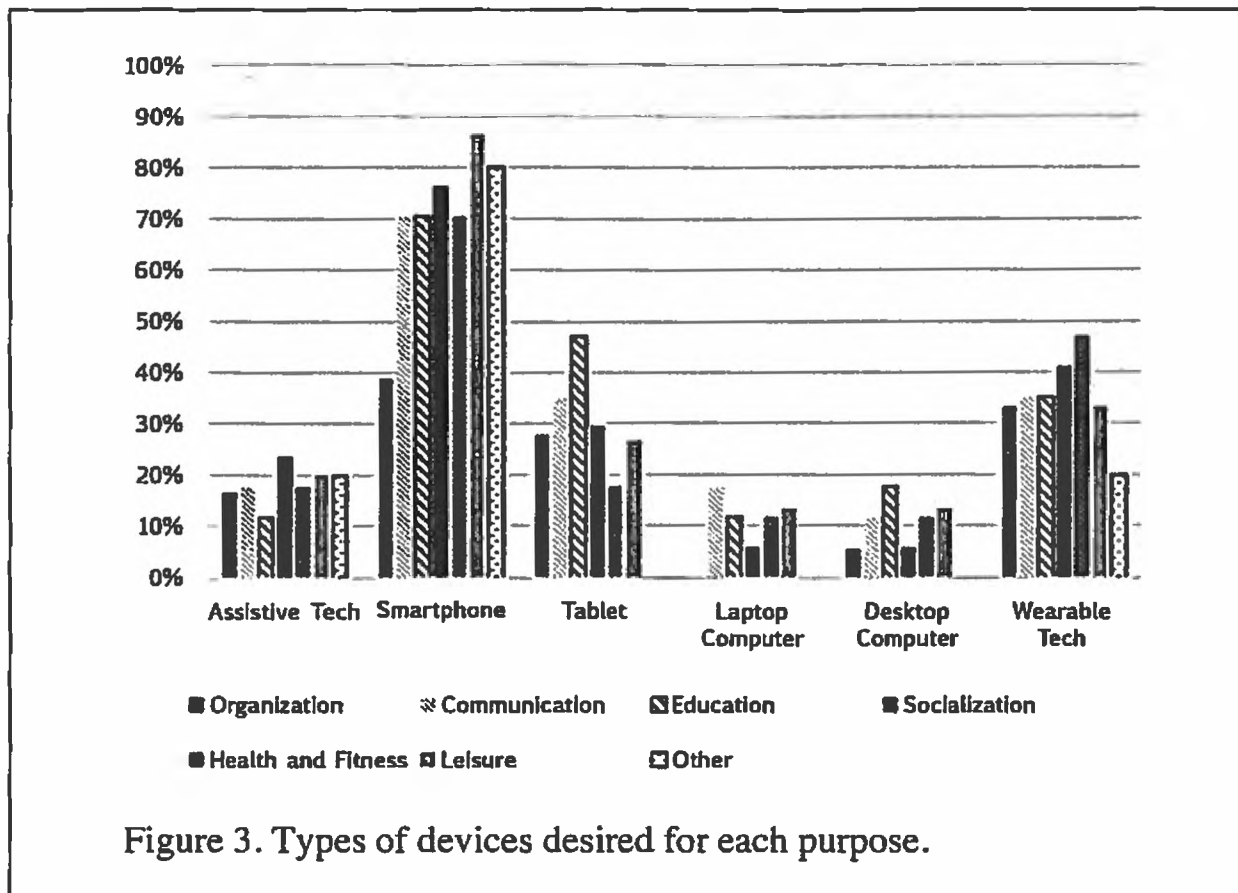


Figure 3. Types of devices desired for each purpose.

of desired uses. Assistive technology devices were found to be slightly more desired for socialization (N=4, 23.53%), leisure (N=3, 20%), health and fitness (N=3, 17.65%), communication N=3, 17.65%), and organization (N=3, 16.67%) than desktop computers. Desktop computers had the lowest response rate and were reported to be the least desired type of device desired for education (N=3, 17.65%), leisure (N=2, 13.33%), communication (N=2, 11.76%), and health and fitness (N=2, 11.76%).

Participants also reported on why some forms of technology were not used. The top five reasons were: 1. too expensive (N=20, 35.1%); 2. other reasons (N=18, 31.6%); 3. don't know how to use it (N=16, 28.1%); 4. too distracting (N=11, 19.3%); and 5. not accessible (N=10, 17.5%).

Figure 4 illustrates these findings. Among the 18 responses of "other reasons," we did not observe a predominant reason.

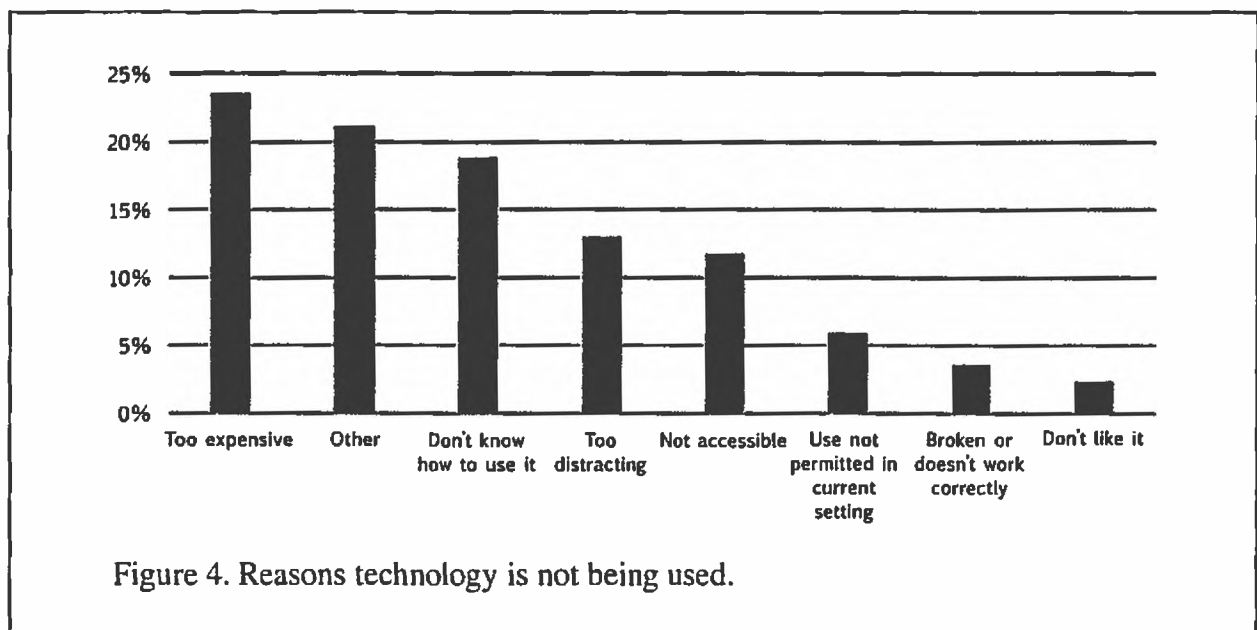
Discussion

The current survey expanded on the work of Okolo and Diedrich (2014) by including individuals having a disability as respondents for themselves, as well

as families or other supports, in addition to educational professionals involved with the individual with a disability. We also explored types of technology being used and categorized it as either assistive or a type of consumer technology. In addition, we wanted to discover what type of technology is desired for future use by people with disabilities and their support networks. Based on the results of the data analysis, the key findings are:

1. Most technology used by individuals with disabilities was personally purchased;
2. Tablet computers are the most widely used device;
3. Education applications were the most widely used across all device types; and
4. smart phones and wearable technology were the most highly desired types of devices.

An analysis of the results of this survey helped us to identify possible key barriers to the use of technology to support individuals with disabilities in New York State. The following possible key barriers identified were: funding issues; device size; and app discoverability.



Key Barriers to the Use of Technology:

Funding issues

We asked how the device was purchased or obtained by the individual with a disability, as the funding for the purchase of assistive technology has been a serious and complex barrier to the use of technology for many years (Okolo & Diedrich, 2014).

The results show that personal purchase was the predominant means of acquiring technologies by the respondents (60%). The acquisition and use of technology might be greater if respondents were more aware of the various sources of funding that are available. According to the Assistive Technology Industry Association website [<https://www.atia.org/at-resources/what-is-at/resources-funding-guide/>] there are a wide variety of funding sources available to assist individuals with disabilities to acquire technology appropriate to their needs. This is an additional area that should be explored to understand the impact of the availability of funding support information on technology acquisition and use by this population.

Survey respondents indicated that smartphones and wearable technology were the most highly desired device types. These also tend to be the most expensive. Additional monthly costs associated with smartphones, such as data plans, impose an additional source of funding stress for smartphone use. With these costs in mind, it is easy to see why tablets currently would be the most popular "go to" device due to their affordability. It should be noted that many applications developed for individuals with disabilities are priced much higher than other applications. These higher costs would create an additional impediment to acquisition and use.

Device size

Even the casual observer of portable technology can see that the size of devices continues to decrease as the sophistication of these devices increases. Consumers have migrated from desktop computers to laptops, and from laptops to tablets and smartphones. Clearly, consumers value portability and size convenience. The emergence of smart watches, fitness bands, and virtual or augmented reality vision-wear are more evidence of the trend to smaller wearable devices. While our findings show that tablet computers are by far the most frequently used type of device across all areas of use, respondents expressed a preference to use smartphones and wearable technology. As in each evolution of consumer technology as more of these devices and the software that makes them useful come to market, prices will fall and adoption will increase. There is no reason to suspect that the adoption of these technologies by people with disabilities would not follow closely. The only impediments may be in the affordability of the hardware and a lag in the development of appropriate software applications.

App discoverability

We were interested in knowing what "top three" apps are being used across portable forms of technology, which includes tablets, smartphones, and wearable technology. We then categorized these per the iTunes Store category designation. We found several irregularities in the categorization of the apps disclosed in the study. Examples of these irregularities in categorization include the following:

- Behavior World Reward Chart: Class and Chore Tracker (\$2.99) is listed under "Education." This is an application geared toward behavior modification and habit development. Other apps related to this are categorized under "Productivity."
- Proloquo2go (\$249.99) is listed under "Education" but it is a symbol supported communication app.
- Talk Tablet NEO AAC (\$79.99) is a speech app for people with autism, aphasia, and other speech conditions, yet is it categorized under "Education."

These examples call into question the discoverability of appropriate and useful applications by individuals with disabilities and those that support them. This discoverability is a likely barrier to the expanded use of technology by this population.

Other Considerations

There are a few conditions/constraints regarding the findings of this study that should be considered: first, the sample size was relatively small given the nature of this project, possibly because it was only distributed through social media. In future studies, researchers might consider other avenues of distribution to increase sample size. Another limitation was that the majority of survey respondents were from the metro New York City area. Even though there are proportionately more individuals with disabilities living in this area, greater survey participation in other areas of the state would provide a better assessment of this topic for the state overall. Finally, providing images or video clips as examples of technologies mentioned in the survey might help to ensure comprehension of survey questions in future studies.

Questions for Future Study

This study leaves many interesting avenues open to explore. As funding is a well-known barrier to the use of technology, it would be useful to know how aware this population is of the financial resources available to them. The availability of technology solutions and software applications that are useful to this population is a two-fold concern. Additional research is warranted to determine which helpful technology solutions and applications currently exist that are not clearly identified (i.e., categorized, described, indexed, etc.) or are difficult to discover. Next, what strategies can be used to encourage the development of more technology solutions and applications targeted to and aligned with the needs of this population? Finally, more study is needed to determine the difference between what individuals with disabilities and those that support them need and desire and what currently is used.

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