# Exploring the Impact of Assistive Technologies in the Classroom for Students with Disabilities

by

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Abstract

This analytical review explores the impact of assistive technology (AT) on academic achievement for students with physical, intellectual, and developmental disabilities in pre-K to 12$^{th}$-grade classrooms. Extant scholarly literature from 2010 to 2015 is examined in this analytical review. Findings indicate that when students with physical, intellectual, and developmental disabilities use AT such as iPads®, software, speech generators, electronic notebooks, and computer-assisted instruction, there was an increase in academic achievement (e.g. spelling or writing skills) and an increase in student engagement. AT may be effective for one student; however, it may not be effective for another student with the same disability. When making decisions about AT in the classroom, teachers must consider the unique, individual needs of students.

*Keywords*: assistive technology, students with disabilities, special education, and iPads®

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# Introduction

During the 1990's, the U.S. government recognized the need for assistive technologies (AT) to support people with disabilities. In 2004, the Assistive Technology Act was passed as an amendment to the Assistive Technology Act of 1998, increasing funding for AT use in classrooms. The Individuals with Disabilities Education Act (2004) mandates that "every child must be considered for assistive technology" (p. 602). AT is defined as "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized used to increase, maintain, or improve functional capabilities of a child with a disability." A number of assistive technologies (e.g. word-prediction programs, instructional software, e-books, and iPads®) are currently being used for these purposes. What remains unclear is whether AT impacts student learning for the better, if at all.

This analytical review explores AT's impact on student learning, especially students with physical, intellectual, and developmental disabilities. Universal Design for Learning (UDL) features within the assistive technologies will also be considered as some AT has features or universal supports for learning that help students with and without disabilities.

The literature about the use of AT is expansive. However, much of the literature is more anecdotal than empirical. Preliminary findings suggest that AT has a positive impact on student achievement for students with disabilities (Chai, O' Vail, and Ayres, 2014; O'Reilly, Lancioni, Lang, and Rispoli, 2011, Rodriguez, Draper, Strnadová, and Cummings, 2013). That said, much of this literature is more anecdotal than empirical and is limited due to small sample sizes, broad claims, and lack of empirical evidence.

## Research Questions

With this in mind, this analytic review seeks to answer the following questions:

- How is AT being used in the classroom with students with disabilities (e.g., physical disabilities, intellectual disabilities, and developmental disabilities)?
- What effect, if any, does the use of AT, have on academic achievement for students with disabilities (physical, intellectual, and developmental) in a preK-12 classroom setting?

**Rationale**

I chose the topic of AT because of my experience working with first and second-grade students with disabilities. Most of the students are classified with *developmental disabilities*. The American Association on Intellectual and Developmental Disabilities (2013) defines developmental disability as "an umbrella term that includes intellectual disability but also includes other disabilities that are apparent during childhood. Furthermore, developmental disabilities are severe chronic disabilities that can be cognitive, physical or both and include Attention-Deficit Hyperactivity Disorder and Autism Spectrum Disorder.

In my classroom, students seemed to be more motivated to complete tasks on the iPad and engaged in instruction when an iPad® was provided. Recently I worked with a student who was learning how to use an iPad throughout the day. To help this student, I attended a training session on how to use a particular application (e.g., Clicker Sentences 6 ®). Previously, I only had experience with using the iPad for recreational purposes and making the transition to using the iPad was overwhelming. I was left wondering how to best use the iPad as a learning tool for the student and as a way to participate in the classroom. As a result, I wanted to study the impact of AT in the classroom for students with disabilities. I wanted to know how AT was used with students with disabilities to help my students and to help my fellow teachers with how to use AT in the classroom to increase academic achievement.

For students with disabilities, especially individuals with visual, motor, and language disabilities, writing with a traditional paper and pencil can be a daunting task. Students with disabilities need opportunities to develop literacy skills and prevent widening the gap in performance between them and their peers (Guthrie, 2004; Morgan and Fuchs, 2007). Students with disabilities need a way to access reading materials that fit their needs. Drawing on the work of Erickson (2005), Morgan and Fuchs (2007) explain how "Reading is a critical element for educational advancement and community engagement. Deficits in literacy negatively impact the quality of life of people with disabilities" (p.9). For students with disabilities who may be at grade levels below their peers, it is important to work towards narrowing the gap of achievement.

## Methods

### Study Approach/Information Retrieval

For this analytical review, I conducted a query using the EBSCO Host and the College, State University at New York Drake Memorial Library to find scholarly and peer-reviewed articles available online. The following keywords *assistive technology*, *students with disabilities*, *special education*, and *iPads*® were used. To provide readers with the most current literature, I limited my search of the professional literature to a publication date range of January 1, 2010 to November 1, 2015. Initially, 810 articles were collected. The literature fell into two groups: research/empirical studies and non-research. Empirical studies involve systematic research with methods and procedures. The non-research group included more anecdotal information and advocacy oriented publications. The two groups of literature were then grouped by the type of disability (e.g., physical disabilities, intellectual disabilities, and developmental disabilities).

Originally, I had wanted to include anecdotal information and advocacy oriented publications, but as I analyzed the articles, I decided to only include articles with empirical data.

Accordingly, during the first phase of the selection process, I eliminated all articles that 1.did not have any empirical data; 2.did not involve Pre-K to grade 12 participants; 3.were not available online as full texts; and 4.were not written in English. For the second phase of my review, I organized and analyzed the research according to kind of disability or disabilities, specific kind and use of AT, and its effectiveness for academic achievement.

## Findings and Discussion

### AT and Software for Students with Physical Disabilities

Students with physical disabilities may need AT that goes beyond low-tech AT such as pencil grips and graphic organizers in order to participate and learn in the classroom and access learning material. Drawing upon Heller's (2010) work, Garrett, Tumlin, Heller, Fowler, Alberto, Frederick, and O'Rourke (2011) acknowledge that "[i]ndividuals with physical disabilities such as cerebral palsy, spina bifida, and degenerative diseases may have motor coordination issues that make handwriting and typing slow, inefficient, or not possible" (p. 25). For students with physical disabilities, AT is important because students may experience difficulty with writing endurance due to muscle fatigue. For that reason, I explored studies including AT such as word prediction programs and speech recognition to see what impact the AT had on supporting students with physical disabilities.

**Word prediction programs.** There is some evidence that word prediction programs successfully assist students who have difficulty producing writing. Six students with physical disabilities from grades three through six participated in a four-week study using the Co:Writer, Word Q, and Write Assist word prediction programs (Evmenova, Graff, Jerome, & Behrmann, 2010). Students selected words from a drop-down list during a 20-minute daily journal writing session and reported that Word Q was the easiest word prediction program to use, having only four buttons to choose from. In this study, all three programs (i.e., Co:Writer, Word Q, and Write Assist) increased spelling accuracy for all participants. All participants benefited from use of one program; improved writing performance within that program was reported. This research suggests that improved spelling accuracy performance and composition rate associated with these software programs helped students whose physical disabilities often make the physical act of writing challenging. With an ability to create text with ease, students may be able to more successfully participate and potentially enjoy activities such as journal writing.

It is important to note that Evmenova et al.'s study (2010), was conducted at a university camp setting, included a low number of participants, and was conducted only for a month. Also, whether or not a word prediction program would work for students with a physical disability depends on the particular student needs. The study points out, for example, that for some students with autism or other disabilities, the voices of the software may prove problematic. As a result, the WordQ program (which has changeable voices) may be a better option.

**Speech recognition software.** Similarly, Garrett, Heller, Fowler, Alberto, Frederick, and O'Rourke (2011) studied high school students with physical disabilities such as muscular dystrophy, using speech recognition software, Dragon Naturally Speaking 7®. Five students, ages 15 to 18, learned how to use this software. Training included the completion of a tutorial and responding to probes for punctuation and navigation. All five students wrote longer drafts when they used Dragon Naturally Speaking7® compared to when they used word processors (Garrett et al., 2011). The students also achieved higher accuracy rates with punctuation. Even though students' accuracy rates were higher, the software sometimes misinterpreted what the students said. Garrett et al., (2011) found that there was an increase in academic performance for students with physical disabilities using this software. The researchers caution that speech recognition software may not work for every student with a physical disability. As the table below shows, students with physical disabilities can benefit from the use of word prediction programs and speech recognition software. Again, it is important to remember that individual students' needs must always be taken into account. In the section following Table 1, I discuss AT and software for students with intellectual disabilities.

Table 1

| Research Question 1: How is AT being used in the classroom with students with disabilities (e.g., physical disabilities, intellectual disabilities, speech or language impairments, and developmental disabilities)? | | | |
|---|---|---|---|
| **Disability/ies** | **Study** | **AT used** | **Summary** |
| Physical- muscular dystrophy, muscular atrophy, spina bifida, cerebral palsy, and vision impairment | Evmenova, A.S., Graff, H.J., Jerome, M.K., & Behrmann, M.M. (2010 | Word Prediction Programs: Co: Writer®, Word Q®, Write Assist® | Composition rate increased for four-fifths of the students and spelling accuracy increased for five-fifths of students in grades three through six. |
| Physical- challenges with fine motor and handwriting, multiple disabilities such as autism and learning disabilities, visual organization difficulties | Garrett, J.T., Heller, K.W., Fowler, L.P., Alberto, P.A., Fredrick, L.D., & O'Rourke, C.M. (2011) | Speech Recognition software: Dragon NaturallySpeaking 7® | Five-fifths of 15 to 18-year-old high school students had higher accuracy rates for punctuation and longer lengths of writing using the software compared to using word processors. |

**AT and Software for Students with Intellectual Disabilities**

According to the American Association on Intellectual and Developmental Disabilities, people with intellectual disabilities may have limitations in reasoning, learning, and problem solving and adaptive behaviors such as social and practical skills (2013). As with any other disability, the extent to which the disability impacts daily life varies by the individual. AT, such as a Pentop computer-assisted instruction for spelling and sight words, can be used to assist students with writing.  Speech generators help students with intellectual disabilities communicate, all of which is reviewed in this section.  These technologies provide prompting, repetitive practice, and a means to gain communicative proficiency.  As suggested below, for some students, computer-assisted instruction, without teacher prompting may not be enough to meet their needs.

**Pentop computer: FLYPen®.** In one study, two male elementary students with intellectual disabilities and one male student with Fetal Alcohol Syndrome, between the ages of five and eleven, used a FLYPen® by LeapFrog® to work on spelling skills over a period of eight weeks in a resource classroom (Doughty, Taber, Bouck, Bassette, Szwed, & Flanagan, 2012). Pentop computers are pens with a built-in computer.  To use a FLYPen®, students use interactive notebook FLYPaper®. The FLYPen® gives auditory prompts, provides feedback on spelling accuracy, and lets writers know when a letter is not legible (Doughty et al., 2012). Researchers collected baseline data through six paper and pencil-based spelling assessments of five words (Doughty, et al., 2012).  As a result of using a FLYPen®, one student went from an average of 2.3 words correct to 2.4, while a second student saw an increase from 2.8 to 4.1.  The third student showed an increase from 2.6 words to 3.1, but notably dropped to baseline of 2 words on a post-test after time had passed.  A significant change in student academic engagement was noted among all three students.  The first student increased his average academic engagement time from 8.3 percent to 41.7 percent during intervention.  The second student saw an increase from 9.3 percent to 54.5 percent.  Similarly, the third student showed an increase from 6.7 percent to 47.1 percent.  The data showed that the FLYPen® slightly increased academic achievement, but had a stronger impact on student engagement.

**iPad® electronic notebook.** In their study that examined science class note taking and student engagement using iPads and electronic notebooks (e-books), Miller, Kruckover, and Doughty (2013), found that two female students and two male students, ages 17 to 18, with moderate to severe intellectual disabilities, were engaged an average of twelve minutes using traditional notebooks compared to an average of forty-four minutes using the electronic notebook. While teachers had difficulty interpreting notes in the paper notebooks, they found it easier to interpret student notes when created with the Dictamus® application on the electronic notebooks (Miller et al., 2013). One problem with the electronic notebook is that it took more preparation time to set up compared to a traditional notebook. In order for students to navigate through the e-book, teachers added dictations to images (Miller et al., 2013).

**Computer-assisted instruction: spelling on a PC tablet.** In a study focusing on spelling accuracy and computer-assisted instruction, one male and two female high school students with intellectual disabilities, ages 18 to 20, were presented with 18 age-appropriate functional words selected by a software program called Grocery Words® and 18 other unknown words (Purrazzella & Mechling, 2013). Researchers included known words to encourage attention to task and motivation. They then presented pictures corresponding to words in random order on a PowerPoint slide on a tablet PC. Again, this research acknowledges the importance of engagement to aid student academic success. Students used a multi-touch tablet PC to with a digital pen or drawing tool instead of a keyboard. Following computer-based instruction, students learned to spell the words correctly and retained the information with 100, 98.1 and 79.6 percent accuracy. It is important to note the small sample size of the study and that the study was conducted in a small group setting. This study presented an alternative way to teach students spelling words besides using paper and pencil.

**DynaVox® and speech generators.** McMillan and Renzaglia (2014) studied how well four male elementary students with intellectual disabilities, ages eight to 12, used a DynaVox® speech generator to produce an audible message. A DynaVox® speech generator looks similar to a tablet computer and includes buttons with simple labeled pictures that say the text aloud when pressed. For example, a button may have a picture of a student shrugging their shoulders with text that says, “I don’t know.” Students with physical disabilities were not included in this study. This makes sense, given that a student with a physical disability may not be able to lift and operate the three-pound device. When teachers provided more communication instruction and used a time delay, all four students increased in their number of device independent responses. Again there was a small sample size, but this research shows that DynaVox® has potential to help students achieve increased communication.

**Simultaneous prompting and computer-assisted simultaneous prompting for sight words.** In another study, two females and one male, fourth and fifth grade students, were given five sight word flashcards, teacher-directed simultaneous prompting (TDSP) and computer-assisted simultaneous prompting (CASP) with Classroom Suite Intellitools® curriculum software which reads the sight word (Coleman, Cherry, Moore, Yujeong, & Cihak, 2015). An example of simultaneous prompting is saying a word and showing a visual cue for the word at the same time. The three students with intellectual disabilities were assigned 35 spelling. Instructors taught the students how to use Classroom Suite® after baseline data of the percentage correct of sight words were calculated and then the students were tested with 10 random flashcards. The Classroom Suite® activity included a visual of the sight word at the top of the screen, with synthesized speech, three word choices at the bottom, and a prompt to select and say the correct word. The results of Coleman et al.'s study demonstrated that students who used

TDSP and CASP made gains with both interventions, but "for two of the students TDSP was more efficient than CASP because the participants reached criterion in fewer sessions...For the other student, both interventions were equally efficient, but he preferred the TDSP" (p. 207).

The researchers caution that "Despite the push for more computer-assisted instruction in today's classrooms, computer-assisted instruction should not be viewed as a superior instructional approach" (p. 207). Clearly, not every student prefers technology over other kinds of instruction or intervention. What is unknown is why students preferred teacher responses over the computer.

Table 2 summarizes all the studies reviewed in this section. The table shows how students with intellectual disabilities can benefit from the use of a FLYPen® that provides verbal feedback, an iPad® application called Dictamus® to take legible notes, a spelling computer-assisted instruction program on a tablet, a DynaVox® speech generator, and computer-assisted instruction with simultaneous prompting using Classroom Suite® to increase sight words. Similarly to the AT discussed for students with physical disabilities, the AT for students with intellectual disabilities I discuss increased academic achievement for most students, but not for all students.

Table 2

| Research Question 1: How is AT being used in the classroom with students with disabilities (e.g., physical disabilities, intellectual disabilities, speech or language impairments, and developmental disabilities)? | | | |
|---|---|---|---|
| **Disability/ies** | **Study** | **AT used** | **Summary** |
| Intellectual Disabilities, Fetal Alcohol Syndrome | Doughty, T. T., Bouck, E.C., Bassette, L., Szwed, K., & Flanagan, S. (2013) | Pentop computer (FLYPen®) | Three male students, ages five through 11, increased the average amount of words written correctly from 2.3 to 2.4, 2.8 to 4.1, and 2.6 to 3.1, but decreased to 2 during a post-test. Student academic engagement behaviors increased from 8 percent during baseline to 41.7 percent, |

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| | | | during intervention, 9.3 to 54.5 percent and 6.7 to 47.1 percent. |
| Moderate to Severe Intellectual Disabilities | Miller, B. T., Krockover, G.H., & Doughty, T. (2013) | E-books, iPad® | Four students, two males and two females, ages 17 to 18, used electronic notebooks for science and the Dictamus® application on the iPad® to record notes. Students were engaged an average of 12 minutes using traditional notebooks compared to an average of 44 minutes using the electronic notebook. Teachers also reported that the notes on the iPad were more readable. |
| Intellectual disabilities | Purrazzella, K. & Mechling, L.C. (2013) | Computer-assisted instruction (spelling on a PC tablet) | Three high school students with intellectual disabilities, two females and one male, ages 18 through 20, were presented with 36 functional words from a program called Grocery Words®. After 39 sessions of computer-based instruction, students learned to spell the words correctly and retained the information with 100, 98.1 and 79.6 percent accuracy. |
| Intellectual disabilities (without physical disabilities that would make it difficult to lift the 3lb device) | McMillan, J.M & Renzaglia, A. (2014) | DynaVox® Speech Generator | Four male elementary students, ages eight to 12, used a DynaVox® Speech Generator and all four students increased their number of device initiations following instruction. |
| Intellectual disabilities, autism | Coleman, M.B., Cherry, R.A., Moore, T.C., Park, Y. & Cihak, D.F. (2015) | Simultaneous prompting and Computer-Assisted Simultaneous Prompting for Sight Words | Three fourth through fifth-grade students, two females and one male, were assigned 35 sight words, taught how to use Classroom Suite software, and tested randomly on ten sight words. Teacher-Directed Simultaneous Prompting (TDSP) was more efficient for two students and the third student equally reached the criterion using Computer-Assisted Simultaneous Prompting and TDSP, but reported he preferred TDSP. |

**AT and Software for Students with Developmental Disabilities**

According to the American Association on Intellectual and Developmental Disabilities, students with developmental disabilities may also have intellectual disabilities (2013). Students with developmental disabilities may face some of the same challenges as students with intellectual disabilities, but again, the needs of the students, even with the same or similar type of disability, vary. Similar to the research for students with intellectual disabilities, AT used with students with developmental disabilities also included a speech generator, software for communication, and computer assisted instruction for writing with prompting.

**Augmentative and Alternative Communication Device: Flip 'n Talk®.** Augmentative and alternative communication devices assist students with developmental disabilities and speech or language impairments with communication. For example, the DynaVox® *Flip 'n Talk*® device by Mayer-Johnson "is a less expensive manual augmentative communication system consisting of a main core vocabulary board of high frequency words and/or phrases and an affixed spiral bound flip chart of categories" (Talkington, McLaughlin, Derby, and Clark, 2012, p. 16). Talkington et al. conducted a study with a five-year-old preschool student. The student had a baseline score of zero attempts to request help at the cafeteria. After the intervention, the student had a verbal request an average of five times over thirty-three days. After two months, the student started talking in short sentences. The student increased the number of verbal requests made. Although, the study includes the number of verbal requests, it does not include specific descriptions of the requests such as length and grammar. Another device with more language options such as varied sentence lengths would be a better option for older students or students with more language skills.

**iPad2® and video modeling of social stories.** Seven students with autism spectrum disorders, five males and two females, ages three to thirteen, used an iPad2® to watch videos of demonstrations of how to make transitions in a school (Flores, Hill, Faciane, Edwards, Tapley, and Dowling, 2014). Researchers observed students during transitions before and after using video models of social stories. The significance of social stories and the iPad® used as AT is that can help students attend to tasks, and transition between classroom activities. By making transitions smoother, it could help students focus on academic tasks, help them with emotional regulation, and in turn help students with their whole day. The authors point out that although visuals are particularly beneficial for students with autism, other students may benefit from having visuals as well (Flores et al., 2014). The researchers reported the students increased the number of independent transitions after the video social stories intervention (Flores et al., 2014). What is unknown is whether or not the students kept the progress they made after eighteen days.

**Proloquo2Go® Software.** In another study, three public high school students with developmental disabilities, two males and one female, ages 13, 14, and 23, used a speech-generating device with graphic symbols to make a request (O'Reilly, Lancioni, Lang, & Rispoli, 2011). Using an iPod touch® with the Proloquo2Go® software, students touched one of the three graphic choices and an iMain2Go® speaker amplified the sound of the speech output. The goal was for the students to request the snacks or toys three times in a row independently. One student did not reach the goal and refused participation. Another student took six trials to reach the goal. The third student reached the goal over nine trials. For students whose academic goal is communicative proficiency, to generate a response, or to respond to others, the Proloquo2Go® software on the iPod® may be an appropriate AT. In addition, the staff supporting the students had to assist students with physically moving their finger to touch the visuals, therefore another AT may be a better choice for students with physical disabilities.

**Computer Assisted Instruction and Simultaneous Prompting for Writing.** In a study of Pixwriter® software, seven to ten-year-old male elementary students with autism created three different stories of their choice with and without templates. Instructors evaluated the four students' work on the number of sentences and the inclusion of subjects and verbs. At the same time, instructors used simultaneous prompting to direct students to look at the screen and look at words, and gave praise for on-task behaviors such as looking at the computer (Pennington, Collins, Kennedy, and Gunselma, 2014). Instructors taught narrative writing skills to the students through the computer-assisted instruction and simultaneous prompting. Three out of five students constructed sentences using the template. Without the template, students had difficulty with word selection. The instructor modified templates to fit the students' needs and the words were removed from the pictures in the array to prevent students from associating the written word with the picture.

The study showed an increase in academic achievement and claimed that computer assisted instruction paired with simultaneous prompting can be effective with some students, but the authors remain cautious, however, as modifications had to be made for the templates and the AT did not result in an increase in achievement for all participants . After students created a story, the instructors assessed students on sight words. Based on pretest and posttest scores, all five participants increased the number of sight words acquired after the simultaneous prompting and computer-assisted instruction of story construction tasks. Although the study was not focused on sight words, this shows that this AT also increased academic achievement for sight words in addition to writing.

Below, Table 3 presents evidence that students with developmental disabilities can benefit from the use of augmentative and alternative communication devices, the use of video modeling of social stories on the iPad®, Proloquo® software to make requests, and the use of story templates software accompanied by computer prompting and teacher prompting. As always, student needs must be accounted for and not all students may wish to use a specific AT.

Table 3

| Research Question 1: How is AT being used in the classroom with students with disabilities (e.g., physical disabilities, intellectual disabilities, speech or language impairments, and developmental disabilities)? | | | |
|---|---|---|---|
| **Disability/ies** | **Study** | **AT used** | **Summary** |
| Developmental Disabilities, Speech and Language impairments | Talkington, N., McLaughlin, T.F., Derby, K.M., & Clark, A. (2013) | Augmentative and Alternative Communication Devices: Flip n'Talk DynaVox® | A five-year-old preschool student went from zero attempts for verbal requests to ask for help to an average of five times over 30 days. The student started talking in short sentences after two months of use of the AT. |
| Autism Spectrum Disorder | Flores, M. M., Hill, D.A., Faciane, L.B., Edwards, M.A., Tapley, S.C., & Dowling, S.J. (2014) | Video Modeling of Social Stories on iPad® | Seven students, five males and two females, ages three to 13, started with a baseline of zero for number of independent transitions and increased the number of independent transitions over 18 days of video modeling of social stories. |
| Developmental Disabilities | O'Reilly, M.F., Lancioni, G.E., Lang, R., & Rispoli, M. (2011) | Proloquo2Go® iPod touch® | Three high school students with developmental disabilities, two males and one female, ages 13, 14, and 23, were trained to touch a visual for requesting a snack or toy with a goal of making three independent requests in a row. One student took six training trials and another student took nine training trials to reach the |

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| | | | goal. The third student refused participation and did not reach the goal. |
| Autism Spectrum Disorder | Pennington, R. C., Collins, B.C., Stenhoff, D.M., Turner, K., & Gunselman, K. (2014) | Computer-Assisted Instruction and Simultaneous Prompting: Pixwriter® software | Five, male, seven to ten-year-old students with autism used story templates on the computer to create three stories while teachers simultaneously prompted. Three-fifths of the students constructed sentences using the story template. All five participants increased the number of sight words scores from pretests to posttests. |

## Conclusions and Implications

### Results

The purpose of this analytical review is to explore the impact of assistive technology in the classroom setting for students with physical disabilities, intellectual disabilities, and developmental disabilities. I wanted to find information about assistive technology to help my students and fellow educators understand more about how AT can be used in the classroom and what it can do for students. I did this by focusing on empirical research that explores how AT is being used in the classroom and examining what effect, if any, AT has on academic achievement for students with disabilities. Findings gained from this exploration show that AT is being used in a variety of ways in the classroom with students with physical, intellectual, and developmental disabilities.

All the research reviewed note an increase in academic achievement or the improvement of a skill after a student with a disability used AT. For example, the results of a study using Co:Writer, Word Q, and Write Assist finds increased spelling accuracy for all participants, writing performance improved for at least one program for each student, and composition rate increased for four out of five students for at least one program (Evmenova et al., 2010). Five students with physical disabilities who used Dragon Naturally Speaking 7, a speech generator, wrote longer drafts of writing compared to word processors (Garrett et al., 2011). Following computer based instruction on a tablet PC, students learned to spell the words correctly and retained the information with 100, 98.1 and 79.6 percent accuracy (Purrazella & Mechling, 2013). Students retained a high percentage of the thirty-six words. This research shows that there is potential for using assistive technology with students with physical, intellectual, and developmental disabilities to increase academic achievement.

That said, the appropriateness and effectiveness of AT depends on the needs of the individual student. Even students with the same disability may not have the same preferences, success, and challenges regarding AT. Thus, it is important for teachers to be mindful when selecting assistive technology and be willing to provide support through prompting alongside the assistive technology. Ultimately, more research with empirical data is needed, especially for relatively new technologies such as iPads®.

While exploring the effectiveness for AT for students with disabilities, I noticed some researchers mentioned student engagement and student preference, but some research did not note what students thought about the AT. Therefore, it would be important for the educators who work with students with disabilities who use AT to be observant and find which AT works best with an individual. Moreover, some of the AT explored above is expensive and would require a teacher to invest time to learn and use the AT appropriately and well.

Professionally, I have been researching the use of video social stories for my students with disabilities. I have been working with colleagues on how to use the AT to help my students.

In researching the effectiveness of AT in the classroom, I can more effectively examine if the AT could potentially help my students. Since AT's effectiveness depends on the student's individual needs, I would need to see if, over time, the AT met my student's needs on academic, social, and motivational levels. I am hopeful that more studies involving the use of AT will be conducted and teachers will more fully realize the potential of AT.

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