

# WHAT WORKS?

## *Research into Practice*

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Research Monograph #50

How can assistive technology support literacy achievement all of students – including those with identified learning needs?

## Assistive Technology Tools

### Supporting Literacy Learning for All Learners in the Inclusive Classroom

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#### Research Tells Us

There is compelling long-term evidence that student achievement can be improved through the appropriate use of technology. If efforts are made to implement assistive technologies effectively for student use, they can enhance:

- literacy acquisition
- flexible and differentiated learning experiences
- student engagement and independence

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We talk extensively about differentiation in Ontario classrooms, but the reality of implementing classroom-based differentiated instruction can be challenging. One way that teachers can support the learning needs of a range of students is through *assistive technology*, which enhances students' ability to perform and complete tasks with efficiency and independence.<sup>1</sup>

It is important to recognize that teachers in Ontario use a wide range of assistive technology devices, including interactive white boards,<sup>2</sup> text-to-speech software<sup>3</sup> and classroom amplification systems.<sup>4</sup> Using such tools in the inclusive classroom has been shown to benefit students by providing flexible learning experiences and supporting ongoing assessment.<sup>5</sup> Further, assistive technology can support both students' engagement in the classroom and their independence in completing class activities and assignments.<sup>6</sup> While there is compelling long-term evidence that student achievement can be improved through the appropriate use of technology,<sup>7</sup> it is important to note that the multitude of rapidly evolving assistive technology devices and programs can leave teachers feeling unprepared for supporting their use in the inclusive classroom. To address this issue, school systems need to put in place supports to enhance teachers' ability to effectively use assistive technology tools.<sup>8</sup>

We are particularly interested in considering how assistive technology can be used to support the literacy achievement of all students, an area not frequently examined in the scholarly literature.<sup>9</sup> In this article, we discuss the range of assistive technology tools available to students and teachers from a Universal Design for Learning (UDL) perspective, wherein strategies, resources and tools are incorporated with the needs of all students in mind.

The Student Achievement Division is committed to providing teachers with current research on instruction and learning. The opinions and conclusions contained in these monographs are, however, those of the authors and do not necessarily reflect the policies, views, or directions of the Ontario Ministry of Education or the Student Achievement Division.

## Assistive Technology Tools for Language and Literacy Development

### Need for training is paramount ...

Assistive technology tools are only helpful if efforts are made to implement them effectively for student use. There are numerous barriers to this, including limited training for students and teachers and limited access to technical support.

Students who struggle with language and literacy – and those who don't – may benefit from assistive technology software. Kurzweil, for example, which converts scanned text to computer-generated speech, is a wonderful tool for students who learn more effectively and efficiently through a multimodal experience that supports decoding letters, sounds and words by listening to text read aloud. Recent improvements, including web-accessible and tablet versions, have made this software more portable and accessible. Kurzweil formatted resources (and other digital formats) such as classroom novels can be downloaded directly and used immediately by registering with Alternative Education Resources Ontario (<http://alternativeresources.ca/Aero/Public/AlternatFormat.aspx>). Low cost and/or Ministry-licensed alternatives include Premier Literacy, Read and Write Gold, wordQ and speakQ and Adobe Reader. Additionally, text-to-speech read-aloud features are now built into many electronic platforms.

A variety of programs and devices are available that support reading and writing fluency through the development of related skills – including organization, fine motor coordination, mobility and keyboarding – and, thus, independence. Many of these computer programs now have similar applications available for tablets.

### Organization

Increased organizational ability is a common need of all students, and assistive technology can support this need. SMART Ideas, an online, Ministry-licensed option, is summarized on the Ontario Software Acquisition Program Advisory Committee's website ([www.osapac.org/db/view\\_software.php?id=333](http://www.osapac.org/db/view_software.php?id=333)). Other well-known programs for organizing information using interactive graphic organizers are Inspiration (also available in iPad format as Inspiration Maps or its free version, Inspiration Maps Lite) and Kidspiration (a downloadable free trial is available at [www.inspiration.com/Freetrial](http://www.inspiration.com/Freetrial)). Similar online programs – such as Spicy Nodes, which is free for individual use ([www.spicynodes.org/](http://www.spicynodes.org/)) – also exist, as well as online graphic organizers found on sites such as [www.livebinders.com](http://www.livebinders.com). These tools provide support for literacy-based activities such as the development of concept maps.

### Fine Motor Skills, Writing and Mobility

Another learning complement is speech-to-text software, which translates spoken words into written text – a helpful bridging-the-gap tool for students who struggle with fine motor skills, writing and/or mobility issues. Dragon Naturally Speaking is the most well-known example of speech-to-text software. Armed with a specialized microphone, a headset and some initial voice training, students can soon begin transcribing their thoughts and ideas into text. Although it is not Ministry-funded, it can be used on iPads (using the free Dragon Dictate application), Android devices (using the low-cost Swype application) or slates equipped with Windows OS 8. The Siri voice-command system on Apple devices can also serve as speech-to-text software.

Co:Writer, a Ministry-funded speech-to-text program, also supports writing ([www.donjohnston.com/products/cowriter/index.html](http://www.donjohnston.com/products/cowriter/index.html)); it works in conjunction with a word processor, providing a drop-down menu of word predictions. Its uniqueness lies in the ability to “mouse over” a list of possibilities predicted from even a few typed-in letters. Co:Writer speaks each choice aloud, allowing students to recognize the spoken word, even if they struggle with typing or spelling. Other portable tools, such as Livescribe Smart Pens, the Notability iPad application, and AudioNote (available for a variety of devices and platforms) combine audio and digital supports for note taking.

## Keyboarding for Writing Fluency

Depending on the needs of – and/or recommendations for – an individual student in an inclusive classroom setting, each personalized set of assistive technology tools may look different. However, one foundational literacy-based skill that will benefit all students is effective and efficient keyboarding. All schools and computers in Ontario’s publicly funded schools can access Ultrakey, a step-by-step tutorial that begins with the basics of correct posture when keyboarding and teaches letter-by-letter skills based on the “home row” of the computer keyboard. A video clip introducing this software can be found at [www.bytesoflearning.com/Videos/UltraKeyPreviewMovie800/UltraKeyPreviewMovie800Alt.html](http://www.bytesoflearning.com/Videos/UltraKeyPreviewMovie800/UltraKeyPreviewMovie800Alt.html).

## Implications for Classroom Practice

Often the ideas which are generated in a staff meeting or in-service professional development activity are lost in the long-term when teachers are confronted with the challenges and expectations of their day-to-day classroom experiences. However, in keeping with the Universal Design for Learning mantra that many accommodations are “necessary for some, and good for all”<sup>10</sup>, we should remember that assistive technology can support the learning of all students. A student who is developing an outline for a report could benefit from using Inspiration. Another student, who is capturing key thoughts while brainstorming for a project, could use Dragon Dictate to focus on ideas rather than keyboarding. Word prediction software, such as Co:Writer could support the student who is keying in information to a computer and does not know the spelling of every word. The use of these types of technologies to enhance achievement in the classroom is increasingly supported by scholarly research.<sup>11</sup>

*So, how can we more effectively incorporate assistive technology with the needs of all students in mind?*

- *Give students, teachers and even parents the freedom to explore.* Many children and adolescents feel less hindered by technology than some teachers. Providing opportunities to try different assistive technology tools helps break down the perceived barriers that sometimes accompany them.<sup>3</sup>
- *Provide students with opportunities to use the available assistive technology.* Rather than limiting computers with Dragon Naturally Speaking or Kurzweil to those students with special education needs, provide training for the whole class. Students can then use the assistive technology when they feel that it will facilitate the work in which they are engaged.
- *Use assistive technology as part of the regular rhythm of the class.* When assistive technology becomes part of the classroom’s “DNA,” students and teachers will use it naturally and organically.<sup>12</sup>
- *Don’t be afraid.* We have changed the ways we teach mathematics and language (among many curricular areas) because of recommendations from applied research. A supportive school environment, where teachers and other educational specialists collaborate with and mentor each other, will support the implementation and use of assistive technology.<sup>13</sup>
- *Evaluate various assistive technology and teachers’ readiness to effectively use it.* A good resource to help in this process can be found in the Ontario Ministry of Education document *Education for All*.<sup>14</sup>
- *Research indicates that technology can support student engagement and achievement in literacy.*<sup>15</sup> To benefit from this support, format your lesson plan template to intentionally incorporate assistive technology tools.

## Supporting all learners ...

Assistive technology can support the learning experiences of all students. A Universal Design for Learning (UDL) approach, which acknowledges assistive technology tools as tools for education, will help to support their use by all learners – both in inclusive classrooms and throughout the learners’ lives.

## Assistive Technology Tools with All Students In Mind

A multitude of easily accessible, online resources exist for educators seeking to incorporate assistive technology in the inclusive classroom. The resources outlined below are sponsored by various Ontario ministries, academic organizations and associations related to students with disabilities, Ontario universities and teaching federations.

- **The Ontario Software Acquisition Program Advisory Committee website** ([www.osapac.org/cms/](http://www.osapac.org/cms/)) offers a variety of Ministry-licensed software programs. Each program (e.g., Dragon Naturally Speaking, WordQ, SMART Ideas) includes tabs labelled Software Details, Curriculum Connections, Resources (e.g., video tutorials) and Assistive, which provide explanations on program-specific features that support distinct student characteristics.
- **The Alternative Education Resources Ontario website** (<http://alternativeresources.ca/Aero/Splash.aspx>) is a repository for alternate format materials. It provides a full listing of resources to borrow in formats such as e-text (e.g., Kurzweil), large print, Braille, and audio CD.
- **The Special Needs Opportunity Window** (<http://snow.idrc.ocad.ca/content/technology>) explains technology for inclusion, accessibility, teaching and learning in the context of the Accessibility for Ontarians with Disabilities Act.
- **The “About Technology” area of the Learning Disabilities Association of Ontario’s website** ([www.ldao.ca/introduction-to-ldsadhd/ldsadhs-in-depth/articles/about-technology/](http://www.ldao.ca/introduction-to-ldsadhd/ldsadhs-in-depth/articles/about-technology/)) provides in-depth articles related to the use of assistive technology. Each page has a “listen” option, providing a text-to-speech alternative for learning this new material.
- **The Teachers’ Gateway to Special Education website** ([www.teachspeeed.ca](http://www.teachspeeed.ca)) provides definitions, articles, policy documents and links to video-based information from experts in the field. Additionally, this site offers commercially-based information related to the use of assistive technology tools in the school environment.

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