Part 2 - Assistive Technology: A Practical Implementation Resource

[Evan Loreto-Lee] Welcome to Assistive Technology, a practical implementation resource. My name is Evan Loreto-Lee, and I'm a teacher and assistive technology consultant with the York Region District School Board.

In this section, we'll focus on how students can use assistive technology to access and produce text, and how those tools can help reduce barriers to learning, including for students who may be experiencing challenges with learning. As we move through this section, consider how these tools might fit within your context. Assistive technology is not meant to replace strategies that are working, but rather to expand access and support a range of learner needs.

Let's talk about how students can use assistive technology to access and produce text. We often speak of these processes in terms of expressive and receptive skills. And while overall curricular expectations don't generally require a particular mode of expression or a way to make sense of written or printed text, it does specify that students should be demonstrating their learning in a variety of ways.

Assistive technology is not meant to replace strategies that are working. Rather, we should see assistive tech tools as modes of accessibility that may be appropriate depending on the skills, strengths, and needs of students in a particular moment. I like to think of assistive tech as the button that can open a door into a building. I don't always need to use it, but I know how it works, where it's located, and I don't need special access to use it.

Assistive tech tools should be understood in a similar way by all students. They are there. I know how they function and I can use them if I need to. So when we consider the ways in which we can support students with accessing and producing text, it's important to first understand why it can be supportive. In classrooms, we encounter students with and without formally identified needs. Some have an IEP with specific instructional, environmental, and assessment accommodations, but some don't. Students in both groups will require support with how they read or write at one point or another, for any number of reasons. When a student struggles with getting the ideas out of their head, onto a page or screen, or even shared in a group, they might benefit from expressive supports. In some cases, students have great ideas, but they have a hard time getting them out. Kind of like a computer that can't seem to connect to the printer. The problem isn't with the thoughts and ideas. It's with the mode of expression. In some cases, students have lots of ideas swirling around in their mind, but they lose track of them because the writing, the typing, or the speaking happens at a slower rate. There are a range of assistive technology tools that can support students in addressing these challenges.

Using speech-to-text tools, for example, can support brainstorming and be broadly valuable for all students. Similarly, students who require expressive supports have the option of using tools like text-to-speech. While the technology has been historically limited in its ability to create lifelike and engaging playback voices, it has been enhanced significantly through the advances of artificial intelligence. Assistive tech can support students understanding of material, but presenting it in a way that is unique and engaging. For example, celebrity voices can be used to read through course material, which might boost interest. By providing students with a suite of available voices tools are becoming more representative and engaging, driven by student preference. Students can also use technology to support their editing. Once students complete a type task, they can play it back and listen to their work and engage their ears as well as their eyes to check to see if their work matches their thinking.

The development of vocabulary can be supported through the use of prediction type programs. These services encourage students to attempt more complex language in their writing by using approximations of words to help them include more challenging language. Students can begin typing the first few letters, and the prediction tool will guess the next word and, in context for them. Many of these tools also provide the ability to hear the words before you insert them, so students can verify whether they're selecting the correct word for their work.

Now you'll notice in the corner, there is, a QR code that you will see at multiple points in this presentation and at multiple points, I'm going to reference the York Region District School Board's resource called Understanding How Process Affects Learning. It's sort of known informally as the revised waterfall chart, because when it's printed, the topics are presented vertically and each topic kind of cascades through each. This resource provides specific links between students strengths and needs, and specific interventions that are supportive. In each domain identified by the chart there are specific references to useful assistive technology and how they can support each area of processing. You'll see that I've linked a QR code in the corner, so you can scan it with your personal device to access the resource.

So when we consider the various areas in which students may need support or may possess strengths, we can use the waterfall chart to help orient us with tools that are supportive. Let's see how working memory, language processing, processing speed, and executive functioning are supported by assistive technology using the waterfall chart. When we look at the memory section in this resource, working memory is defined as “The ability to hold information in mind, to work with it, or apply it.” Students who have difficulty holding information in their mind can rely on those tools listed at the bottom of the section shown on the screen. With tools like Text-to-Speech students can hear back any instructions, details, or relevant content to ensure they're remembering it accurately. One important feature of text-to-speech is that students can do this as often as they need, without asking for help each time. Think about situations in which students may, may not have someone maybe at home or their family, somebody to help them

read through this. Allowing them access or providing them this access to text-to-speech gives them the autonomy to help boost their own sense of independence, because they don't necessarily need to wait for support when it's needed if the content is available digitally for all students.

Similarly in the language section. Language processing can be divided into comprehension and expression across all of its domains - oral, nonverbal, reading and writing - any of which can be affected in individuals with learning disabilities. When we refer to the assistive tech supports at the bottom of this section, a similar suite of tools are listed as broadly supportive for students with language processing needs. Prediction tools, for example, help students with their expressive abilities. Similar to a keyboard on a digital personal device, prediction tools provide the next suitable word to aid in expressive fluency. The accuracy and relevance of the words that are presented are getting more and more helpful through artificial intelligence. In years past, these tools may have just relied on a, sort of, static algorithm to predict the next word. But now tools can reference the words that are used in previous sentences to suggest relevant, subject-specific words. For example, if the student is talking about soccer previously, the words suggested will be soccer related rather than just random next words. When we consider processing speed, the waterfall chart defines it as “The ability to perform simple tasks quickly and efficiently.”

In some cases, students may require additional time to think about a topic or a question to formulate their best response. Tools listed in this section provide students with the ability to reduce the demands of the task. For example speech-to-text tools can reduce the cognitive load by avoiding the demands of writing. In some cases, we may need to capture student thinking, and it doesn't need to be in writing. Speech-to-text tools can help students with processing speed difficulties share their ideas more comfortably and executive functioning, which refers to the skills that apply to the ability to plan, organize, and to monitor learning behavior and emotions. The waterfall chart lists text-to-speech, and this can be either on a document or through scanned material using optical character recognition or OCR technology to turn it into readable text, but then the user can interact with as a supportive tool that provides audio prompts to remind the student of the sequence of steps that they may have to take or remember in order to complete a task.

Now, when we're deciding on the best tools to support students, it's important to be aware of the options. As the use of artificial intelligence expands into educational technology we see many iterations of the same kinds of functioning. Most commonly available tools have a free option designed to draw users in, and in some cases, to generate ad or data sharing revenue. It's important to understand the privacy and the security implications of any tool before you provide yours or student's personal information. In many boards, processes have been established to limit access to staff and students so unlawful access cannot be granted. In all cases, it's essential to include your administrator and families in any proposed plans that may share

personal student information with any external source. Check with your digital literacy team to understand your school or district's policy around creating student accounts or using digital tools in the classroom.

Now, it's important to note also, that many of the assistive tools that students could be using to support their learning may exist within the device already. For example, Windows devices, Chromebooks, and Mac computers all have accessibility features that can be turned on to support students accessing and producing text. Devices that receive updates will function with current iterations of their accessibility features. Ensuring that users can access the most current version of these supports at no extra cost. So these settings are saved to the current profile and in some cases can be more reliable than a third party tool. Using A.T. through the accessibility settings can also help students understand the functional value of the tool, rather than focusing on a particular brand.

For example, instead of seeing text-to-speech functionality as a “Read&Write” function - Read&Write being a tool that's most commonly used in schools - students can then better generalize the use of the tool because they understand it as text-to-speech versus that particular brand, and they can come to expect that across devices and beyond, licenses purchased by schools or other sources. So before you decide on a tool, consider yours and your students options. Does the school or school district or board offer licenses for assistive technology already? Many publicly funded school boards make tools like Read&Write for Google Chrome available to all staff and students with training or resources provided by staff who support assistive technology specifically. Accessing these board or school supported tools ensures that they have been reviewed and assessed for privacy and security and should be safe to use with students.

If there are no tools available to support a specific need, consider exploring your device accessibility tools. What can your device do on its own to support learners? For example, Chromebooks have a whole suite of accessibility controls that are accessible through the toolbar in the bottom right corner that can turn on text-to-speech, screen reading and other such features. Similarly, text on a website using the Chrome or the Edge browsers can read text using its internal read aloud function. To access these and other internal controls, you can just google the name of the operating system with the word accessibility. Alternatively, asking an AI chat bot like Gemini or ChatGPT, you can get a step-by-step instruction explaining how to access these features on any platform.

For reference, here are some of the tools that are available to support students and your own work. I should note that as educators, we need to model the use of these tools as well as the agency required to decide when a tool is necessary. We want students to see these as valuable and valid, regardless of any formal supports that they have access to. We can embed text-to-speech tools to read a selection for the class instead of reading it ourselves, not because

we can't do it, but because it shows that we consider it to be an effective and supportive tool. Listed on the table are the key expressive and receptive tools to support students with things like reading and writing.

Notice the first column is identified as functional language. It's important that we leverage tools and not necessarily brands. Students will be better served to understand what speech-to-text is, knowing that Read&Write has this function. And we know also that once they leave us, once they move on to maybe post-secondary opportunities, we want students to be able to cobble together a menu of whatever works best for them. And these services need not be brand specific. Licenses that are provided by schools won't automatically carry forward for them, so students need to understand and feel empowered to use the tools that are most supportive. You can also check out a link shared in the corner via a QR code. The article linked explores a range of assistive technology tools as it connects to the concept of universal design for learning.

Now, what I'd like to show you is how we can use these tools in practice. What does it look like in a specific example? Again, I'm going to show examples of tools that I have access to, and not to say that these are the best options, but to show you what some of these tools are capable of. So looking at some of the tools that we've talked about. Let's bring up some examples. You'll notice on the screen I have a handful of different, sort of, selections that we can use to demonstrate this. And for this demonstration I'm going to rely on a program called Read&Write for Google Chrome. As I mentioned previously, this is a commonly accessible tool in many different school districts and so I'll use this as a vehicle to explore some of these tools.

So before we even start, I want to make sure that it's clear how to even begin with this tool. So you'll see that it lives on the top of my screen as an extension to the Chrome browser. And with extensions, they live inside this little puzzle piece here, but when I'm ready to use the tools I would want to use this little purple puzzle piece with that, with the RW inside. And that's the icon to open up Read&Write. So I click it once and it opens up this toolbar. Now when I'm using this tool, it's got many different features. But when I'm working with students, I also want to show them that these are not all tools that you have to be using. Right. So it's perfectly okay to pick one and rely on it. Now, for this, section, I want to talk about how we can use text-to-speech in practice. So what I've got on the screen here is a selection from a larger piece. And I want to show you some of the features of text-to-speech software. So I'm going to just double check that my profile is accurate, and I'm going to use the one that I've created for presentations. So when I'm using text-to-speech, what I want to do is I'm going to select text that I want to hear. So in this case I'm going to put my cursor before the words that I want it to read - notice that is now blinking in front of it - and I'm going to press the play button.

[AI speech] World's largest seal.

[Evan Loreto-Lee] Okay. So I can read this title and the students can do this as often as they

want. As I mentioned before, sometimes one time isn't really enough, asking the teacher to read, or waiting for them to be available so you can ask them a question about what this says and can really sort of break a student's focus or flow in terms of their learning. So having them understand that this tool is available at their fingertips they can listen to it whenever they want as many times as they want. Okay so again, if I wanted to select a section I'm going to highlight it, and I press play.

[AI speech] In the freezing ocean waters of Antarctica, the planet's largest seals make their home in a frozen world.

[Evan Loreto-Lee] Okay. And you'll notice, too, as I mentioned previously, that this is an AI enhanced voice, and it is very conversational. It seems comfortable, and I could have students listening to this and they would think it's an expert reader, almost sounding like an audiobook. So the way the technology has advanced makes this tool, sort of, a long way away from where we used to be, where it was a sort of monotone, almost very robotic sounding voice.

So our text-to-speech lives on the top of this toolbar. I highlight the text that I want and I press play. And again, there are different ways to demonstrate this using other tools. And I'll show you a few others as well. So one of the other things that I mentioned too is the presence of prediction software. So on this toolbar again there is that tool available. It's a second tool on the Read&Write toolbar and in order to turn this on I'm going to press this button, and it highlights it by making it that, sort of, purple color. And you'll see as soon as I did that, that pop up appears just below the cursor. So it sort of brings me back to where I'm writing. And notice, even before I start typing, the words that are suggested are related to the reading that is coming before it. So again, showing how the advancement of AI and the technology with prediction, it's not just a random selection of words, it's words that are subject related to what we're talking about. And so even in this case, what I can do is if I'm not sure if the word that is presented is the word I want, there's a setting to make sure that I can hear it. So I hover

[AI speech] Seals.

[Evan Loreto-Lee] and I can hear the suggestion read back to me. So for some students, just visually, they may not understand what that word is, but just by hovering over that word,

[AI speech] Elephant.

[Evan Loreto-Lee] I can hear the word to make sure it's the correct word. And when I want to select it.

[AI speech] Seals.

[Evan Loreto-Lee] I click it and it drops it into my sentence. Okay.

So that is prediction software. And again this exists on many devices just hovering above the keyboard. But in this case it's presented as a learning tool in amongst other tools available. So I'm going to go ahead and turn that off and look at some of the other features. Next what I'd like to do is I want to show how we can use these same tools to support with learning new vocabulary. Learning new vocabulary is one of those things that is very tricky for some students, especially if they don't have anybody that they can sort of ask those questions of. Maybe the teacher is unavailable or speaking with another student. I can have, these tools available to support me with this new language. So what I can do instead is, instead of asking for someone to, sort of, read and sound this word out, I can use these tools to read it for me. And I like to use this word. In fact, I use this word when I work with students and they often think it's a made up word, it's not a real word because it's so long, but it's fun to have them practice saying this word and getting comfortable with this word using this playback feature. So again, I bring my cursor to the beginning of the word and I press play

[AI speech] Otorhinolaryngologist.

[Evan Loreto-Lee] So again I hear the word and I and I can hear how it's read. Maybe it's a bit too fast so I can actually slow that down by going into my settings. And I can say “you know what, I want that to be a little bit slower” just to make sure that students can hear the different parts of the word.

[AI speech] Otorhinolaryngologist.

[Evan Loreto-Lee] And so with successive practice and trying it again, I can have students learning new, challenging language that doesn't rely on the teacher telling them what that word is. So we're using these tools again, not just to read or to write, but we're using this to build skills because students are going to encounter challenging words that they're going to have to be able to use.

And so that playback feature is really useful for that. Now, I mentioned before too that text-to-speech functionality can be very helpful when we're looking at editing a sentence. And especially with younger students, it's sometimes difficult for them to read their own writing and see how they can improve it. And so one of the ways that we can use text-to-speech is to leverage it as an editing tool.

So students know that they read over their words. But you can... What I like to try to do when I visit their classes is to show them how hearing can also support that process. So I'm going to read it, but I'm also going to listen to it. And this is an example that I like to put up in front of them. And so what happens is I'll put it in front and i’ll say “ok, do you notice anything weird

about this sentence?" And some of them will say yes and some will say no, but all of them go and play it and see if I can get everyone to catch it. So again, my cursor at the beginning of the sentence and I press play

[AI speech] He was late, so he ran to the the classroom.

[Evan Loreto-Lee] And even the first time I play it, as soon as they hear "the the classroom", they recognize that there is something that is weird that needs to be fixed in the sentence. And it's not something they immediately notice, but because they've heard it then they're saying, "ah yeah, of course I heard that as an issue with that sentence.". And so again, showing them that that auditory support can be very helpful, especially when they're editing their own work. Now I'm going to have some students that will always remind me. They'll say, "hey sir, you know what? If this was on a regular document, you'd see that little blue squiggle to say you've written the word twice." And I'll say, yeah, absolutely.

That's another assistive tool that we can rely on." But again, we want to make sure that we are using a diversity of tools. We understand that sometimes that blue squiggle is all I need. But also sometimes hearing those words are really, really important. Another example I like to share with them is like this. So I'll play this sentence for them as well.

[AI speech] I wish I had a Nintnendo Swtich in my bedoorm"

[Evan Loreto-Lee] And obviously there's a lot of spelling mistakes wrong with this sentence, but it's the hearing of it that sometimes catches students attention- that maybe their eyes would have said, okay, that says, I know that says a Nintendo Switch in bedroom, but hearing it makes it absolutely clear that something needs to be corrected. And again, students will say, but sir, the red squiggles will come up on the bottom of those words, telling me that they're spelled wrong. But again, I will affirm that as another tool, but showing them that having that additional strategy of listening is also very effective.

Now, the next thing I want to show you is how we can use this kind of work with a PDF document, for example. Now, a PDF document, of course, is a document that is typically fixed and unchangeable. Now, there's been a lot of advancements, to help students convert PDFs into very useful documents. And so I'm going to show using the example of a program called OrbitNote. Now OrbitNote is a PDF annotator. It is a tool that is often paired with Read&Write for Google Chrome. And it's something that students may be familiar with within your board or school district. But it doesn't have to be this tool. Many of them will do the same sorts of things. So when I'm using this tool, again very similarly what I can do is I can highlight the text that is on this PDF, okay. And I can use the playback feature by pressing play just up on the toolbar.

[AI speech] The world's best known scientist died on March 14th.

[Evan Loreto-Lee] So again, I have this tool available. I can listen to the text that's presented for me. I don't need someone to read it to me. I now have this tool that wherever I am, whether I'm at school or I'm at home, I can listen to the text that's that's presented for me. And I can do this with a number of things. I can use it on a document, I can use it on a PDF, and I can use it on any time the text is selectable, like maybe it's on a website, I can use that to listen to it as well. Another feature that I can use when I'm trying to show students how this tool can be a supportive assistive tech is something called speech-to-text and sometimes called STT or voice typing. Speech-to-text is the idea where I have thoughts in my mind and I can express them verbally, but maybe I have a hard time writing them down. So let's imagine I have a thought that I'm trying to brainstorm. So in this case, let's say I'm choosing a structure in an animal cell, and I want to explain why it's important to the cells functioning. So I can actually use my voice typing to support this, especially when I'm thinking about maybe technical words, words that are challenging to spell for some students. And I can say, “you know what, I want to talk it out because, especially in this age of AI and other tools that are often used to substitute brainstorming, I can show my teacher that I'm generating this content.”

So what I can do is I can either click on this microphone within my Read&Write toolbar, or even within Google itself. I have access to this in the tools menu. So in this case I click on tools. I go down to voice typing and notice that that mic pops up as my voice typing tool. And when I'm ready, what I need to do is I click into the box, into the sort of target area where I want to record, and then I press the microphone. So imagine I wanted to brainstorm as much as I could think of about an animal cell. And especially with animal cells, there's a lot of structures that are challenging to spell, but I can say them, I've talked about them before. So I can say something like “okay, I need to make sure to discuss the mitochondria. I need to mention the smooth and rough endoplasmic reticulum. I need to think about the Golgi bodies and the nucleus. But I'm not going to mention anything about the cell wall or the chloroplast, because those are structures within a plant cell.”

And so when I'm thinking about ways to support students, this, while not perfect, not ready to hand in is a really good way to show students that you have tons of things to offer. You've got lots of ideas, and those ideas can be put down onto a document. And then from there, we can kind of pull out the stuff that's useful. So for example, I'm going to say, you know what I'm thinking about an animal cell there's lots of structures that are challenging to spell. But I'm going to try to practice. So I'm going to make sure that I want to discuss the mitochondria. And in this case, I'm going to rely on my highlighting just to sort of pull out those key pieces. So I'm going to highlight it just to kind of keep track. I'm going to mention the smooth and rough endoplasmic reticulum. And I'm going to mention the Golgi bodies and the nucleus.

And I may even mention the fact that I don't want to get into anything about the cell wall or the chloroplast. So again, these are pieces that I can sort of grab from here. And it's not like I'm just

taking this information from another site. I'm not going on to ChatGPT and saying, hey, give me my brainstorming notes. This is something I've generated and I can use to show my teacher that I am actively engaged at all stages within my learning.