Assistive Technology- Practical Implementation Resource

[Evan Loreto-Lee] Welcome to the LD@School's Practical Implementation Resource webinar. In this session, we will explore hands-on ways to use assistive technology to support your work at school. My name is Evan Loreto-Lee and I'm a teacher and Assistive Technology Consultant with the York Region District School Board. In my work, I support all staff, students and families with assistive tech tools to help break down barriers, leverage strengths, and support learner needs.

Throughout my career, I've actually been a secondary department head and assistant head, and a classroom teacher, supporting learning strategies at all levels, as well as in a self-contained, intensive support classroom. Today, we will explore common assistive technology tools that can reduce barriers and support students in accessing, engaging with, and demonstrating their learning. This webinar is organized into a few focused sections, so you may choose to engage with the full resource or explore specific areas based on your interests and needs.

Now, as always, I encourage you to adjust your learning environment to meet your own learning needs. For example, you could increase or slow the playback speed of this video found on the video menu in the bottom of your screen. Or you can turn on captions to support your comprehension. As we navigate the topic of assistive technology, think about the ways in which you can lead the exploration of tools in your context.

Sometimes accessing assistive technology can be, maybe, outside of your realm of comfort, but one of the best ways to learn how to use these tools is to integrate them into your practice. For example, just by including captions for the videos that you play for students, or maybe using a voice note to capture your thinking, or allowing text-to-speech engines to read a passage that you would have otherwise read.

It shows students that these tools are available at all times and have value to all learners at one point or another.

In this webinar, we're going to explore the topics on the screen. Specifically, we'll look at A.T. broadly how students can use it to access and produce texts. How students with

learning disabilities, ADHD, and other neurodiverse profiles can support their writing, organizing, and thinking and how they can support their own interaction with texts, as well as exploring strategies to use assistive technology when working with texts.

Now, before we begin, it's important to identify what we mean when we highlight assistive technology. Because this term can be used widely to encompass both digital and analog tools. I'll note that many of the tools explored in this webinar are digital, but this isn't to suggest that analog tools don't hold importance in the classroom. Assistive tech can be a Chromebook or an iPad, or even the physical items in your space that boost student access, engagement, and or expression.

Schools and districts generally provide access to a suite of programs that are supported by regional versus school based staff and the IT infrastructure, as well as the support teams available for staff.

Now, assistive technology can be any tool or service that extends access to instruction, the physical or digital learning environment, and assessment. In order for assistive technology to be supportive, it needs to be safe. It needs to be compatible with the existing digital environment. It needs to be reliable, available and current. In terms of promoting safe use of assistive technology

programs used in schools must be vetted in terms of the measures taken to ensure privacy for student data and safety for students when interacting with the various functions of the program. Before any student data is even provided. Working closely with your digital Literacy and IT support teams will provide insight on the safety and suitability of an app or software as it relates to student safety.

When we talk about whether or not a tool or software is compatible, it's important to know that if it will fit into the existing digital environment that exists with the school. So if a student is trying to access a school or board purchased license, but it doesn't align with the current technology in use, for example, like, you have a windows based tool being requested for students who have iPads, then that tool will neither be supportive nor accessible.

When we think of the reliable use of devices, I want you to consider about how the technology in your space is working generally. Technology meant to support students must be reliable, which means it can do things that it's supposed to do. For example, if a computer is missing keys or has a cracked screen or won't complete necessary

updates, it's not going to function properly and would only add to any frustrations experienced by users in the classroom.

Next, assistive technology should be available. Students who require assistive technology to meet curricular expectations should have ready access to it. Additionally, and ideally, educators have predictable access to technology that is known to students so they can advocate for their needs and use their assistive devices whenever they're required. Lastly, tools should be current. And I know this one is a difficult one to control for a number of reasons this can be a challenge to keep pace with the evolution of technology. However, there are often adjustments to programs that shift key functions or maybe shift the user experience. This evolution requires a flexibility and an openness from educators and students to accept the idea that change, while sometimes uncomfortable, can often provide access to more effective and comprehensive tools.

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.

In this section, we'll focus on how students can use assistive technology to support the organization of writing and thinking, and how these 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 instead it is meant to expand access and support a range of learner needs. Now, let's consider how learning disabilities and other processing challenges can influence organization. Whether a student is attempting to assemble their ideas into a coherent written piece, oral presentation, or some other product, the ability to gather different pieces of information. Explanation and analysis can be difficult without explicit support. Many assistive technology tools can support this process to ensure that their strengths are boosted and their needs are supported. Many tools exist to help educators and students

with templates or organizational frameworks that guide their thinking and facilitate the creation of a coherent, final product. In many cases, these strategies benefit from being pre-taught and intentionally integrated into classroom practice.

So let's explore some of the common organizational tools available to support writing and thinking. Now, organization is an essential quality in students who successfully navigate learning environments, particularly when they are asked to create some kind of product, students are assessed, in part, in their ability to share their thinking in a logical and a coherent way. For some students, this is challenging, and they might need explicit strategies to organize their thinking, writing, or speaking to ensure their message is clear and aligned with the specific and or overall curricular expectations being explored. Using pre-existing structures can support students as they plan out their thinking and allow them to remember key elements that may otherwise be forgotten without prompting.

So let's orient this processing difficulty with the waterfall chart. As noted in the bottom corner of your screen. As with other areas of processing, the waterfall chart groups requisite skills and directs educators to specific strategies available for support. If you're interested, scan the QR code with your own device to see the revised waterfall chart available for you. And note that this is a resource provided by the York Region District School Board, and it's called the Understanding How Processing Affects Learning Resource. So this excerpt is taken from the final page of the waterfall chart. One helpful feature of this document lives in the final page. By presenting overall skills broken down by areas of processing as well as with an easy to understand description for each. For example, organization is broken up into six domains. We have language, visual motor skills, visual spatial perceptual skills, memory, attention, and executive function. Notice how these different areas work together to make up effective organizing skills. And when there's a breakdown in any one of these areas, the whole organizational process can be disrupted. Assistive technologies can support each of these areas. And let's see how we could leverage tools to support students who would benefit from tools to support with organization. But we dig deeper into difficulties with visual motor skills we can see the graphic organizer can be a supportive tool. Visual motor skills are described as the ability to coordinate the eyes and the hands to produce and guide physical movement. And this shows up in students' abilities to efficiently write out letters or copying information off board, including digital graphic organizers like mind maps can help students express their thinking with a clear structure so they can work towards developing their independence when note taking, generating ideas or any other task that encourages a thoughtful and structured response. Notice also that the inclusion of

speech-to-text software on the listing of supports for assistive technology, and this and similar tools can be integrated into organizational software. For example, I can dictate my thinking into a text box on a mind map created on a Google drawing, or on to other programs like Mindomo using a voice note or the Chromebook or the Mac, or the Windows speech-to-text tool. So all of these tools will work on my mind mapping software. So again, I don't need a tool like Mindomo, which is a third party mind mapping software in order to organize these thoughts.

Similarly, visual spatial skills are described as the ability to organize visual information into meaningful patterns. This shows up in students abilities to see specific content or items against a particular background. Like the ability to notice certain words or text on a page with a distinct backing colour or scene. Using a feature like text-to-speech can highlight and playback any readable text on a document, which draws the individual's focus into an area they may have missed without that support. Sharing a digital graphic organizer or a mind map can be customized to ensure all students can see their target content. Encouraging students to adjust materials as needed helps them understand their efforts as integral to the process of building accessible learning spaces. Students might miss key information if they can't access necessary accommodations and organizational tools like text-to-speech or mind mapping software.

Through a shared understanding of tools, educators can help students interact more comfortably with the content, building independent skills as they navigate the curriculum. It cannot be understated how important the teachers use of these tools, the modeling of these tools is to the student's use of those tools, and it can be really intimidating putting these sorts of learning processes on display for the students to see you potentially fumbling through can be very intimidating, but it's really important.

And as lead learners in those classrooms we can show them this journey, show them that despite the discomfort, there can still be learning. In fact, without discomfort, there generally isn't that learning. So by being those sort of brave bodies in the room to try something new, we can show our students that that kind of an attitude is very, very beneficial. So when we're considering the right tool to support students, and your own efforts hopefully, consider the comparison identified previously with third party tools may provide a more seamless user experience when generating a mind map, but sometimes they're often limited unless you're able to access a paid license. System tools generally have at least one program with which to create a simple line shape mind map. But unfortunately, they're not really optimized to do this work. So choosing the most appropriate tool for this work may be guided by factors beyond your control. Specific

districts or school policies may determine which option is permitted. So it's important you understand this factor when making decisions around any assistive technology software. If you have the opportunity to make recommendations for a program that optimizes mind mapping, consider how these tools work within your existing assistive technology suite of tools.

For example, ensure that a tool that you're going to choose works with the text-to-speech or speech-to-text engine and other tools that are recommended for accessibility. For example, if I'm using my windows text-to-speech function can that work to generate text in my hopeful mind mapping software that I hope to bring to my district. In most cases, tools that are advertised as “free” will only provide limited access. Full access generally requires a paid subscription. Also an important consideration is how the tool connects to learning management systems like Brightspace or Google Classroom. Many will connect educators directly with their learning management system to make posting classroom activities or assignments easier. But these are the sorts of things that we must consider when choosing a suitable tool.

How do they work and play with the tools that we've already got working in our environment? Now, alternatively, you might prefer to rely on existing tools on your device to visualize thinking. Most major operating systems have a program that can be used and will do the basics of mind mapping with a line and a shape drawing. I like to think of the old use of Microsoft Paint. It's a basic program that has the functions that we may need to do this work. Even programs like the current version of Microsoft PowerPoint, Apple Freeform, Google Draw may do the trick for most users. As we noted previously, consider the existing status of tools already in your digital environment. Is there a tool that's provided already? Have you really thought about how you can leverage the existing access through the system tools that you already have access to?

As with all tools, we want to be certain that they are supported by our school and district privacy and IT security departments. Whenever we're making recommendations for digital tools, it's essential that we mitigate any potential risks to student data. Be sure to connect with your digital literacy team to learn more about the tools that are permitted in your digital environment. Now, let's take some time to explore three different mind map platforms that may be available in your school or your district within their digital environment. So the first option that we have available is just a simple Google drawing. Now to access a Google drawing you can actually just type in “drawing.new” and it will take you - as long as you're in Google Chrome and you're signed into your school

Google account -it should take you directly into a new drawing area. And within this we can add our shapes, right? I can use these for us. In this case we have a Venn diagram. But I could use this as any kind of mind map. And any time that I want to connect them, all I'm doing is taking these shapes and layering them over on top of each other and I'm adding in text boxes. And so I could build this out for students and then I can share this drawing diagram with students as well. And one interesting, maybe easy way that we can do this notice on the end of your URL where it says edit. If I type in the word copy instead of edit and I hit enter what it will do is it will force a copy for students to use as a template. And then when I'm ready to share, I want to copy this entire URL and I can drop it into my learning management platform, into my Google Classroom, or into my Brightspace or whatever it is that you're using. And this way, students can be accessing their own copy.

And I'm going to obviously want to ask them to share that with me. So that just to make sure that I have access to the work that they're doing. Now another option that we have is something like PowerPoint. PowerPoint as a presentation software can be rethought as a mind mapping software as well. And the nice thing about PowerPoint is there's a lot of templates that already exist, so you don't have to build this from scratch. You can take something like the example that I've provided on the screen, and you can repurpose those different sort of bubbles and text based on the topic that you're working on. So it doesn't require you to build this from scratch. There are templates available for you to use.

Now, the other option that I would like to share is through a program called Mindomo, and Mindomo is a tool that is available in some school districts, and it allows students to build their own mind maps in a very sort of interactive and supportive way. So let's see what that looks like. So Mindomo, as I mentioned, is a mind mapping software and it allows students to build mind maps in a way that leverages lots of different sort of input. So I could insert different multimedia, which could involve images, videos, or even audio recordings. Maybe a student isn't comfortable presenting in front of the class, and instead of using their own, maybe Google Slides or PowerPoint or other presentation software, they can actually use this mind map as a presentation, and they can record what it is that they want to say into the presentation. So they can click on this and they can record what it is they want. And then when it's time to present, they press play and the audience can listen to that recorded message. But the nice thing about this is we can customize how this is, how this is designed and we can adjust this. And for some students, this visual representation is really helpful.

And I can say, okay, if I've got my topic, if I'm trying to argue something, I need three distinct reasons and not only do I need three reasons. I want to be able to write about it. And if I have evidence about it, maybe I can include a picture or a video, and maybe I can record my thinking about that first reason. Because for some students, maybe the difficulty is getting that information sort of down, onto the document. So maybe I'm thinking about it and I want to capture it as a voice note so that I can keep it there as a sort of a way of making sure that I don't forget what I'm thinking. And in this case, in an environment that I'm familiar with, a tool like Mindomo will also work with Read&Write so I can actually use my existing assistive technology to support my mind mapping software as well. And this will work within my Google Docs. I will use this in my... I could even use this in my Google drawing, but if I want to turn it on, I click on the same place that I showed last time when I was in the document. I press the button and it pops up ready to go. And what I could do is I can use my voice typing to help generate my ideas verbally.

If I'm having difficulty writing it out, I can use this to help brainstorm. So I can go into my main reason and I can add some, some additional context. And so one of the nice features is I can type a note. So if I'm trying to sort of explain something, I can turn on my microphone and I can talk it out so that I can think about the different ways in which I can support this particular topic and when I stop talking, it will drop it into the box.

Okay, so I combine these tools and the different functionalities within them, and I can ensure that students can sort of mix and match as they need to. And whether it's through Read&Write whether it's through the internal windows speech typing device, I can use these tools to help gather that information.

And as I mentioned, there are lots of mind mapping tools available, but some I find are a little bit more robust than others. So presented on the screen is a table that identifies the functional language, a description of the tool, and some examples. Note that these examples obviously are not, an exhaustive list. Nor are they necessarily an endorsement for their use. But make sure that you connect with your school or your school district to see if there are already tools recommended for use. You can also check out the link that's shared via the QR code in the bottom right hand side of the screen. As this resource explores a range of assistive technology tools, as they connect to the concept of universal design for learning.

In this section we'll focus on how assistive technology can support students in organizing their thinking and their writing, and how these tools can help reduce barriers

to learning, including for students who may be experiencing challenges with their learning. As we move through this section, consider how these tools might fit within your own context. Assistive technology is not meant to replace strategies that are working, but to expand access and support a range of learner needs. So in addition to reading and writing and organizing their thinking, students will need to interact with and work within texts. While there are many ways for students to demonstrate their learning, we will explore the tools available to make student learning visible.

Tools such as PDF and document annotators allow students to capture and markup content from websites that can provide another layer of visibility for students thinking. As we navigate the influence of artificial intelligence and student learning, and we look for different ways to demonstrate knowledge, these tools can support students in annotating and sharing evidence of their thinking, their wondering, and their connections as they work through texts.

But before we explore the different ways that we can interact with and work within text, it's necessary to identify the reason why text annotators are helpful. When we're supporting students with diverse learning needs, it can be challenging to observe progress as they're working through a task. In a large class, I may not be able to connect with every single student to discuss their progress or get any questions that they may have as often as I'd like. Similarly, without the opportunity to speak with each student as they work through something, we might miss out on the chance for rich conversations that could supplement our assessment for student learning. Document annotators allow educators to see how students have interacted with resources through doodles, through text boxes, through sticky notes, comments, voice notes, or other helpful options.

In some cases, these marked up documents can be shared through learning management systems, so they're easily accessible for the teacher. Educators can use this work as a kind of roadmap to see where students start and progress towards as they work through larger tasks, and especially as we grapple with the effects of AI on student work. Annotators provide teachers with the tools necessary and the students with the tools to capture process work, which is sometimes really hard to measure. When we can see where a student begins with a topic, we can see more of a trajectory of their work and of their thinking. Moreover, we can share feedback with students early on so that they can feel confident about the product they're completing, knowing that they're on task and on topic. So students who struggle to interact with text or work within text to synthesize their own thinking might have difficulty in the domains of memory,

attention, and or visual spatial skills. Tools like PDF annotators or OCR scanners, which make scanned documents readable with most assistive tools. These ensure that all learning materials are automatically more accessible.

When we can open a PDF, for example, and be able to select the text, add text based notes or comments, or integrate dictation or voice notes, or connect with other more specific tools students have far more access than they would with a PDF file on its own. Historically, PDF files were locked so they couldn't be modified. Technology, thankfully, has shifted to recognize the importance of a user's ability to add their thinking to a PDF document in the form of annotations. Let's explore the ways in which these areas of processing might affect the learner's needs.

Now, before we continue, I want to draw your attention to the QR code in the bottom right of the screen. This will link you to a document produced by the York Region District School Board, called Understanding How Processing Affects Learning, and more, sort of, commonly known as the waterfall chart. As we go through the next examples, if you have the ability, try to access this document so you can follow along.

So when we look at the memory section of the waterfall chart, we can focus on the idea of retrieval. Now retrieval as this the document suggests, involves the use of strategies to quickly and efficiently access information. It can be recall and or recognition. PDF and document annotators can support students retrieval of information by encouraging them to actively engage with it.

Students can be encouraged to add a sticky note with a connection to self, to the world, or to others. They can draw doodles on the document and to be added, they can create cues for remembering key information. Text can be added in the margins of the content to highlight thinking and or voice notes can help students restate, summarize, or question what they've read in their own voice, which can be revisited when they review their notes for a summative assessment. By providing these anchor points in the learning material. Students can revisit moments in their thinking and build connections that help them recall key ideas so they can apply. They can analyze. They can evaluate the content. Educators also can use this evidence of thinking as formative, ongoing assessment data to understand how students are navigating this content.

If a student doesn't have any annotations, it could be a signal that the conversation may be necessary to check in and see how the student is progressing through the task, and maybe if they have any questions. Attention can be supported in a similar way, as

students can boost engagement through annotations that capture interests and leverage strengths. Reading OCR scanned content - and that's the content that's selectable when you hover over it with your cursor - it allows for the use of speech-to-text software. The current state of this technology can provide a seemingly endless supply of engaging, humanlike voices to help students attend to the content being explored. Reading scientific concepts, for example, with the smooth, comforting drawl of Morgan Freeman might be more engaging, memorable, and captivating than if a student had to read the content in their head or hear the teacher just read it out loud. Text-to-speech can also reduce working memory demands, allowing the students to focus on the message being communicated rather than the added task of decoding. When students understand how text-to-speech can work in PDFs or on a website, they become more active in the creation of accessible spaces.

As I noted previously, the inclusion of PDF annotators and tools that encourage students to interact with and work within text can support a student's visual, spatial skills. Difficulty with visual spatial skills may show up in a student's ability to decode and understand information presented visually, like in graphic texts, charts, maps, graphs, tables, or pictures. PDF and document annotation software can be particularly supportive, as it can increase comprehension of the visuals that are presented. Now, this could be done by the educator in partnership between the educator and the student, or by the student alone. By including annotations for marks on target text, students can rely on the additional cues to remain focused and navigate the resource with greater independence. If a student is able to understand the components or features of visual content, they can pre-empt their navigation by adding in cues and reminders about how they can explore the resource effectively with minimal support.

By adding a voice note with an audio description to prime the student, with maybe some text or context details or task instructions, we can support the student's ability to interpret that visual information. If we can help them by giving them that auditory cue, they'll be able to navigate the text a little bit more independently. And all of that can be done as a recording outside of our interactions with those students. PDF document annotators are powerful tools that allow students to navigate documents actively and with the strategies that fit best for them. While document annotation is much more common on most operating systems, like on Google Docs or Microsoft Office, Word or Apple Pages, for example, PDF annotators are less common as a standalone program. PDFs were historically managed by programs like Acrobat Reader, but now most, if not all, web browsers can also open and annotate PDF files as well. These are what I would consider to be system tools that are made available without any additional downloads.

The most current version of web browsers will let us doodle or highlight or playback any text, as well as comment on the document. These have become the current standard across programs. When we look to current tools like OrbitNote, Kami or Dochub the offering of the tools are expanded. As we would with third party tools we must be sure that they have adequate security and privacy settings. Because we're going to be working with student generated content we want to be certain that data privacy and security is prioritized. Typically with paid subscriptions, programs will commit to protecting user data, but not always. Conversely, when we access free versions of software, it's typically under the assumption that user data may be shared or accessed by the company. So, as a general rule, refer to your school or district digital literacy policy to understand your responsibilities with student data and whether or not you should be accessing specific third party programs.

Now, when we're deciding on the best tool for your class, be sure to investigate any existing paid licenses provided by your school or your district. Many schools have paid access to PDF annotators because it ensures a measure of control and security over the user data. Programs like Kami, DocHub, OrbitNote and Acrobat may do many of the same things, so you might want to explore each to understand how each might benefit yours and your school's needs. Also, it's important to consider how your chosen program connects with other assistive tools that are maybe in use in your board or in your school. For example, OrbitNote is a program provided by the same company as Read&Write for Google Chrome, which is a pretty common assistive tech tool available to most students. The shared ownership provides many overlapping functions, buttons, and access, so students don't need to learn a whole new platform for each set of tools.

Similarly, how the tool integrates with your learning management platform like Google Classroom or Brightspace is important as well. Can you cross post content from your chosen PDF annotation to Google Classroom easily? Can you assign files housed in Dochub with Brightspace? These kinds of questions of compatibility are important and should be explored in situations where tools are being considered for use.

Now let's see how some of these tools work. As I mentioned already, many will do the same kinds of things, so your decision to choose one program over another might be less about the specific tools and more about how it connects to existing programs, your IT infrastructure, student or staff skills, budgets, etc. I'll explore both a browser based PDF annotator and a third party tool. Note that again, my exploration of one or either isn't meant to be an endorsement of either tool, but it's an exploration of available

options. So let's dive in. First, let's look at how Microsoft Edge opens and interacts with PDFs. So the document that you see on the screen is a PDF document, as you can see in the URL. And what we can see here is when I enter into this document, there are a handful of options.

So the first one is just a table of contents. How the document sort of is organized, and in this case there's only one page, but it may be sorted for for larger documents. It's it's a way to navigate between those pages a little easier. But then I have my highlighting ability which just allows me to select different parts. And if I wanted to highlight, I can choose sections to kind of keep okay. And again this offers multiple colours, different thickness or thinness in terms of highlight, okay? I could also do some sort of drawing, right, I can make my annotations with a freehand drawing. And I have the ability to delete all of this as well.

Okay. So with these tools I can also add text. And when I'm finished with this I can have all of these annotations remain on the PDF. And if I were to open it in a different program, all of those changes, all of those annotations would also remain. And that's one of the really great things about the state of PDF annotation right now, is that most of these companies have the intention of ensuring that all changes done on one program will translate into another.

So the next thing I want to talk about is the ability for it to playback. Now, because I can select this text, I can highlight... You notice that when I when I go over the text, my cursor changes to recognize that there is selectable text as well. And when I want to listen to it, all I need to do is click on this. This icon and it will automatically start reading the text in a sort of preset voice. So I'm going to click it so you can hear

[AI Speech] The Three Little Pigs. Once upon a time there were three little pigs.

[Evan Loreto-Lee] and with that I can always adjust all of those sorts of things. I can slow the speed down. I can choose a different voice as well, and it gives me different features. Now I can change the voice options. I can slow it down, and I can change actual the voices that are accessed when when reading as well. So the playback feature is is a pretty useful sort of easy to access as well as a translation feature. Okay. And as well as my usual sort of adjustments. So like I mentioned previously, I can also identify the different ways that I can make this document a little bit easier for me to read. So I could even do simple things like zooming in to make sure that the text is available. I can also rotate the page if the pages is not sort of oriented correctly, but then when I'm

finished, what I can do is I can, I can print the document or I can save it with my annotations. And this is how I preserve the things that I'm doing with my document. So using something like Edge, and the built in PDF annotation feature is something that students should be aware of. And again, it doesn't necessarily have to be on this browser, but to show them that this is a function that we can expect with a PDF document is important.

So now I'm going to show you what this looks like with OrbitNote. Now OrbitNote again is think of it like a companion tool to Read&Write for Google Chrome. And OrbitNote is one of those tools that again holds a lot of different functions. And I'm going to pull that up right now. So as you'll see with OrbitNote there's lots of functions. Again that may or may not be useful. But when we're looking at having students interacting with and annotating PDFs, some of the more common or more useful things would be tools like my highlighter. So similar to what we saw on the Microsoft Edge annotator is these same highlighting feature. So I can identify text, I can highlight the important stuff that I want to keep, and I could even use different colors showing students that maybe different colors represent different pieces of information. I can also use shapes, and I can have students say, you know what, I want you to draw a box around the part that was most important. I want you to remember that as an important feature, because this has sort of the main argument or the main sort of topic sentence in there as well.

So I can use these different features to support, that annotation for my students. And then I can use, maybe I can release that by, by taking this document and maybe, and sharing it with them using my, my Google Classroom, for example, in this case, or if it's connected to two other services. So again, I have these annotations, I can use like my freehand drawing. I can say, okay, this is important. I want to remember that date or this is something that I don't understand. So I can draw a question mark. And for some students that kind of an annotation would be really helpful. And as a teacher, I can see the work that they're doing because I can make this, individual for each student so that any annotations that is made is made by one student and only available for me to see. So if I'm sharing this document using Google Classroom, for example, I can go in and I can share this with my class by making a copy, just like I would do with, with a Google doc, file as well. And then any annotations after I've shared that document with them is then sort of private, just with me, so I can see that progress. And it's not made public. It's not something that other people can see or comment on, but I can use these annotations to help inform the journey the student is on when they're learning this new thing. So a few other features that I haven't identified.

So I mentioned that there was the ability to do text. So in this case I click down. And I can also use the dictation or speech input when I'm using that as well. And I can do basic formatting, things as well with that text. I can do... I can drop down, sticky notes. So I can maybe take a longer, maybe a question or something that I'm not quite sure about. I can write that down in the note. And when I click off, it just lives as an icon on my document, sort of, a reminder to go back there and get that information. But the nice thing, too, about this program is not all icons are the same. So I can use a question mark to represent something that maybe I'm not quite sure of, or an X or a check to say things that I like or I don't like. So these annotation tools can be really helpful because it shows student thinking as they're working through, a new text, for example. But this in addition to those annotation tools, I still have all of the other accessibility features, the playback features, access to things like a text based dictionary or even a picture dictionary. Right.

So if I want to understand what this word is, all I need to do is click on it and the picture will give me an image to help me support. Or I can have a text based description. And if I don't need those, I can turn them off, right? If students want to get rid of the things, they can just get rid of everything as easily as they put them on. Okay, so I have the ability to add or subtract for students. They can do that work themselves. And I have my playback features and a few others that would be useful. Okay. Another function that we can share with students that I think is really useful and maybe something that I think once students understand that it's available they would see, actually educators as well, would see the value in is the ability to comment in sort of multimedia ways.

So notice that when I'm in this program and I have maybe a comment I want to make about a particular sentence. If I grab a sentence, notice what happens when I let go with the mouse. You'll see a comment button pop up. And what this does is it invites users to to type in a comment, maybe a question. You can add anything in here, but notice particularly with OrbitNote it allows you to use these same sorts of features, right? So I can dictate using my speech input. So I can click this and it will type out what I'm going to say. So I can say something like - What does this even mean? And it drops it in and I can actually play it back.
Right.

[AI Speech] What does this even mean?

[Evan Loreto-Lee] And if I wanted to, I could also even add a voice note. And a voice note is really neat because it lets me capture my thinking without trying to translate into

text. And for some students, voice typing where it's taking the voice and it's putting it into text doesn't always work well.

So what I could use instead is what's called a voice note. And a voice not just is like a voice note that we would see in a in a chat room, or like it's almost like a voice mail on a on a phone. It leaves a message for either the student. It could be for collaborators, other people that are supporting on this document, or group members that they need to ask questions to.

Or it could even be from the teacher to the student where they are capturing their own questioning, being like, “Oh, I like what you're doing here. Could you give me a little bit more information? I don't know if you sort of caught everything on this document that was most useful. Maybe pay attention to paragraph three” for example.

And those notes are then imposed on to this PDF. And then anyone with that access has access to that audio file. So one of the really nice things is it allows you that text. It allows you the audio as a way of keeping these comments ready to go and sort of prominently placed so that you can see student thinking. You can also encourage student thinking by reminding them of things that they may not have noticed. So lots of different ways that we can include that feature into their navigation of PDFs. And I should say this is a tool that's available also on documents as well. So as I mentioned, there are lots of different tools, PDF annotators or functions within existing programs that will do this work for you and for students. But some are more robust than others. So the table on the screen identifies the functional language, a description of the related tools, and then some examples. And again, these examples aren't meant to be sort of the only ones that are available, nor are they the best ones necessarily. I'll say that programs like OrbitNote are quite common because it is a related product to things like Read&Write for Google Chrome.

So again, sometimes these are tools that are available for your use and for student use. But I'm not saying that these are necessarily the best tools that are available. So if you are interested in understanding, a more detailed exploration of this assistive technology, there's a link in the bottom right corner that will take you to an article that explores these tools within the context of universal design for learning.

So to conclude, assistive technology can come in so many different shapes and sizes, including in your operating system through accessibility features or added onto your school or district provided computer in the form of a paid license or installed program.

We must therefore be aware of what assistive tech looks and sounds like from the vantage point, as educators, as well as how it could be used by students. Well, we don't need to commit to any one brand of assistive technology. Knowing the overall functionality of the main tools is vital to its effective use. Referring to resources like the York Region District School Board's, Understanding How Processing Affects Learning, or the waterfall chart resource we can make clear connections between students' skills or areas of need, and interventions for support.

So as you continue on your A.T. discovery journey, remember that there are resources within your school or district and even at your fingertips through tools like Copilot or Gemini that can answer questions about this software and how to use it. Success with assistive technology is a mindset. Even when the tools don't work, we can still model the idea that our environment, flexibly designed can boost strengths and support areas of need for all students. But we know that this support can be especially felt for those with learning disabilities. Thank you so much for listening to this practical implementation resource.

Again, my name is Evan Loreto-Lee and I hope this was of value to you. Thanks a lot.