Evaluating Accessibility

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Hypothes.is Social Annotation

This chapter is annotated every year as part of an undergraduate/graduate class on Teaching and Learning with Technology. To turn off the highlighted text, click on the "eye" icon in the top right corner of the browser screen.

Introduction

Imagine you are searching the web and find the perfect video to explain a topic your students have difficulty understanding. You go to work the next day prepared to show the video at the beginning of class, hoping to clear up any confusion. However, when you start the video in class, most students cannot hear it because the audio is too low and the volume of the computer speakers cannot be increased. And you find out that the closed captions in the video are inaccurate. Only the students closest to the computer speakers and those with exceptional hearing capabilities are able to benefit from the video, leaving most of the class feeling more lost than they were before.

How can you prevent a scenario like this from happening in the future?

How do you ensure all students have equitable access to learning?

Let's talk about evaluating the accessibility of digital tools and apps. **Accessibility** is described by the Office of Civil Rights as:

> When a person with a disability is afforded the opportunity to acquire the same information, engage in the same interactions, and enjoy the same services as a person without a disability in an equally integrated and equally effective manner, with substantially equivalent ease of use. (as cited in Curry, 2018, para. 2)

As educators, we must strive to **create fully accessible learning environments** for our students. This requires designing inclusive learning environments and evaluating the accessibility of digital tools and apps before using them in the classroom to ensure all learners have the same opportunities to access and engage with course content.

What Happens When Learning Environments Are Not Fully Accessible?

In early 2020, with the shift to emergency remote teaching during the global pandemic, many educators required students to use digital tools and apps that were not accessible. This left visually impaired and blind students frustrated and struggling to keep up with their peers. Read more in the **American Foundation for the Blind's Research on Education for Children with Visual Impairments During the COVID-19 Pandemic**.

In this chapter, we will first discuss how to design accessible and inclusive learning environments with technology. Then, we will introduce you to the POUR model for assessing the accessibility of digital tools and apps to use in your practice. We will showcase how to evaluate digital tools and apps for different types of disabilities. Finally, we will conclude the chapter with an overview of free, easy-to-use assistive technology tools for designing accessible learning environments and experiences. Before you get started exploring the chapter, watch the Evaluating Accessibility of Digital Tools and Apps video embedded below for a brief overview of the chapter content.

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Universal Design for Learning

When designing instruction, the universal design for learning framework (Center for Applied Special Technology [CAST], 2020) can serve as a guide to support the development of accessible and meaningful technology-rich learning experiences. The term **universal design**, coined by Ronald Mace, was originally developed as a response to inaccessible built environments (Burgstahler, 2019). Mace and his colleagues defined universal design as:

> The design of products and environments to be usable by all people, to the greatest extent possible, **without the need for adaptation or specialized design**. (NC State University, The Center for Universal Design, 1997, para. 1)

For example, sidewalks with curb cuts (i.e., a small ramp or graded slope down to the street) make it easier for everyone to access the street, including individuals who use wheelchairs and those who are on bikes.

The Curb-cut Effect and Championing Equity

"In a highly cited 2017 article in the *Stanford Social Innovation Review*, lawyer, activist and policy expert Angela Glover Blackwell highlights the curb-cut effect as a framework for understanding the community-wide benefits of any innovation specifically designed to achieve equity for an underserved group. 'There's an ingrained societal suspicion that intentionally supporting one group hurts another. That equity is a zero-sum game," writes Blackwell. "In fact, when the nation targets support where it is needed most—when we create the circumstances that allow those who have been left behind to participate and contribute fully—everyone wins'" (Collins, 2021, paras. 13-14).

The concept of **universal design for learning (UDL)** expands this idea to the design of learning experiences and environments. CAST developed three guiding UDL principles to assist educators in developing accessible learning experiences:

- **Multiple Means of Engagement** refers to designing learning experiences based on students' interests and motivations (e.g., giving students choice in their learning experience, the content, and the technologies they use).
- **Multiple Means of Representation** means providing more than one way to access and learn the content (e.g., an e-book that features text, embedded videos, and virtual manipulatives).
- **Multiple Means of Action and Expression** provides students with multiple ways to show their understanding of the content (e.g., giving them a digital media choice board).

Learning experiences and environments that are flexible, multimodal, and student centered are more equitable, accessible, and inclusive. Watch the UDL at a glance video by CAST to learn more about the design of quality learning for all.

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You may be thinking, “I don’t have the time, resources, or ability to differentiate learning for all 30 (or 150) students.” That’s where technology, including digital tools and apps, come into play!

Using technology, you can offer multiple ways to learn. For example, you could setup QR codes that students can scan based on how they want to learn about a topic (e.g., view a virtual tour, listen to a podcast, or read an e-book). You can create opportunities for student choice and support flexible learning pathways (explore the Teaching with Digital Tools & Apps chapter for more information about playlists, hyperdocs, menus, and choice boards).

However, **many digital tools and apps are not designed with accessibility in mind**, and introducing a new digital tool in your classroom that is not accessible can be a barrier to learning. So, before you start redesigning your lessons to feature a variety of digital tools and apps, it is important to learn how to evaluate these technologies for accessibility.

Evaluating Digital Tools and Apps

The easiest way to start with your evaluation is to look for an **accessibility statement** or Voluntary Product Accessibility Template (VPAT) for the digital tool or app. For example, Flipgrid’s accessibility page states it features closed captions, integration with Immersive Reader (a tool that makes reading more accessible), and text with video. Additionally, Flipgrid can be navigated by keyboard, voiceover, and screen reader technology. Another good example is Kahoot’s Inclusion and Accessibility Policy. However, it is important to note, even when there is an accessibility statement or VPAT, these are often self-reported by the company and can be limited by the knowledge of accessibility of the person(s) creating it.

Twitter Thread: Asking About Accessibility

Check out Walei's (@CorruptedSight) list of prompts to ask a vendor to determine if a digital tool or app is accessible in this Twitter Thread.

Unfortunately, many tools and apps do not provide accessibility information. Even worse, many tools and apps have not been designed with accessibility in mind. This leaves it up to you, the educator, to evaluate whether a tool is accessible. While evaluating an app for accessibility can be time consuming, it is critical to ensuring students have accessible and equitable learning experiences. And, the more you practice assessing accessibility, the easier it will become.

The POUR Model

One popular model for evaluating accessibility is **POUR (Perceivable, Operable, Understandable, and Robust)** (National Center on Accessible Educational Materials, n.d.). Keeping this acronym in mind can help you remember what to look for when evaluating digital tools and apps.

Watch the POURing Over Your Website: An Introduction to Digital Accessibility video below and read on to learn more about each of the four components of the POUR model.

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Perceivable

The first letter in the POUR model, "P," stands for perceivable. When evaluating a digital tool, you should examine whether **all students can interpret and access all information** provided by the tool.

For example, most PDFs are not designed with accessibility in mind, leaving students who use screen readers (i.e., an assistive technology device that conveys on-screen information through speech) unable to access information from a

PDF. Similarly, many design-based digital tools, such as 3D modeling tools and infographic creators, do not interface with screen readers, making them inaccessible to students who are visually impaired. When color is used to differentiate text or signal key information, individuals who are colorblind may struggle to know where to focus their attention or find information. These are all things that can negatively impact the perceivability of a digital tool.

Closed Captions in Every Language

If a digital tool or app has embedded videos or audio files, or if it has a video-based help center (e.g., YouTube channel), take a close look at the closed captions. Are they 100% accurate in English? Are they available and accurate in other languages as well?

Image by PublicDomainPictures from Pixabay

Keep in mind your non-English and non-native-English speaking students when evaluating the perceivability of digital tools and apps. If you have a class with one or more students whose native language is not English, see if the digital tool or app has media with closed captions that can be translated into other languages.

Remember, video captions benefit everyone: "Captions are particularly beneficial for persons watching videos in their non-native language, for children and adults learning to read, and for persons who are D/deaf or hard of hearing" (Gernsbacher, 2015, p. 195).

Bonus Tip: Look for tools that support real-time auto-translation of information, like PowerPoint, which offers real-time translation of what a presenter says in more than 60 different languages. Learn more about multilingual support of digital tools and apps in the Evaluating the User Experience chapter.

*This callout box was written by Joanne Patalano.

Perceivability Activity

Take a look at the Perceivability examples from the University of Iowa website.

Then, examine at least one the following three tools for their perceivability:

- Tiki Toki (a timeline creation tool)
- Piktochart
- Scratch

Reflect: What did you notice? Did you look for an accessibility statement or VPAT? Is information presented in multiple ways (e.g., text and visuals)? Would students face any barriers to using these tools?

Operable

Watch the "Hungry Fish: Common Accessibility Issues" for an example of an inaccessible app that does not interface with VoiceOver and learn more from the blog post "How to Check for App Accessibility."

Disabled students may need to use assistive technology, such as screen readers, voice control, head pointers, specialized keyboards, or mouth sticks, to use and navigate a tool. Unfortunately, some tools are not designed to be accessible by everyone, including individuals who use assistive technology.

For example, many digital tools, online resources, flash-based games, and websites require precise mouse movements, which prevents visually impaired users from navigating the tool with a keyboard or voice control. This also prevents users with loss of motor functioning skills from operating the tool with their assistive technology (e.g., mouth stick, head pointer). Some tools are designed with small-sized buttons or input features that cannot be enlarged, which makes it hard for a user with dexterity issues or a mouth stick to interact with the tool. These are all things that can negatively impact the operability of a digital tool.

Watch the "Hungry Fish: Common Accessibility Issues" for an example of an inaccesible app for VoiceOver below and learn more from the blog post "How to Check for App Accessibility."

Watch on YouTube

Operability Activity

Step 1: Select a digital tool from the Online Tools for Teaching and Learning website and complete the **No Mouse Challenge**.

Step 2: Use the tool with a **screen reader enabled** on your device and pay close attention to what information from the screen is read aloud to you (Voiceover on Apple; TalkBack on Android; Narrator on Windows).

Step 3: Try to operate the tool using only **voice control** (Voice Control on Apple; Voice Access on Android; Windows Speech Recognition).

Reflect: Was the tool operable? Would all students be able to easily navigate and use the tool?

Understandable

The third letter in the POUR model, "U", stands for understandable. Understandable tools **present information and navigation features in a way that is easy to comprehend and remember**.

For example, text-based information should be presented in a clear and concise manner. Technical and academic jargon should be limited. Complex language or terms should be scaffolded (e.g., providing links or pop-up boxes to definitions of hard-to-understand words and/or providing the information in multiple formats, including text, illustrations, graphics, videos, and/or audio).

The design of the tool plays an important role in understandability as well. Tools and apps should not provide too much information at once (causing cognitive overload) or feature advertisements or extraneous materials that can distract

the learner. Additionally, the tool navigation should be consistent, simple, and easy to follow and remember. **Well-designed, understandable tools allow the user to focus their attention on learning** rather than navigating or remembering how to navigate the tool.

Understandability Activity

Explore one of the following tools with a focus on whether it would be understandable for all learners:

- Worldometer
- Scratch
- History Pin

Reflect: Was the information provided easy to understand? Was complex language scaffolded? Were directions or instructions provided in a clear, concise, and simple manner? Was the tool well designed? Were you able to navigate the tool with ease? Could you quickly figure out how to use the tool? Were you able to locate where you were within a tool and navigate to other features or pages with ease?

Robust

The final letter in the POUR model, "R," stands for robust. Robust tools are **compatible with all technologies**. Robust tools can be accessed and used on any device and browser, new or old. They allow for integration with assistive technologies, such as screen readers, voice control, and specialized keyboards.

Unfortunately, many tools are not robust. For example, you might find the perfect app for your students only to discover it works solely on iPads, and your students have Chromebooks. Or, you may come across an excellent Flash-based math game, but it cannot be accessed on iPhones or iPads without paying for a Flash-based browser like Puffin. Or, you might find a captivating geography app, but it isn't compatible with your students' older tablets.

There are a number of tools and apps that do not integrate with screen readers, voice control, older devices, or certain browsers. Evaluating how robust a tool or app is before asking students to use it can prevent the frustration that comes along when some, or all, students realize they can't access it.

Robust Activity

Select an app from Common Sense Media.

Try out and evaluate whether the app can be used on multiple devices and browsers. Examine whether the app integrates with assistive technology.

Reflect: What did you learn? Were you able to find a robust app? Why do you think most digital tools and apps are not robust?

Evaluating Technology for Learners With Disabilities

According to the United Nations Convention on the Rights of Persons With Disabilities and Optional Protocol (2006), "Persons with disabilities include those who have long-term physical, mental, intellectual or sensory impairments which

in interaction with various barriers may hinder their full and effective participation in society on an equal basis with others" (p. 4).

While some disabilities may be visible to people (e.g., using a wheelchair), other disabilities may not (e.g., hearing loss or dyslexia). Some disabilities might be short-term, rather than long-term. There are many ways to categorize different types of disabilities. For this chapter, we will focus on the following four broad categories: physical, sensory, communication, and cognitive. These types of disabilities can influence whether a student is able to access and use digital tools and apps for learning.

Physical Disability

A physical disability is a condition that limits a person's ability to "move about, to use arms and legs effectively, to swallow food, and to breathe unaided" (as cited in ScienceDirect, 2020). There are various types of injuries and health issues that can cause physical disabilities, such as cerebral palsy, arthritis, traumatic brain injuries, or even a broken arm from playing a sport. For students with impairments in body function or mobility, it can be challenging to use digital tools and apps that require motor input.

When evaluating the accessibility of a digital tool or app for students with physical disabilities, determine whether it:

- Can be used if an individual has dexterity issues.
- Can be controlled by means other than touch, such as voice, head movement, or mouth stick.
- Is easy to operate (e.g., provides large menu buttons and text input fields).

Sensory Disability

Sensory disability is an impairment that affects one of the senses, including sight, smell, hearing, taste, and touch. Since information is traditionally presented through visual and auditory means in classroom settings, this can provide additional barriers to those with sensory disabilities, especially those who are blind, deaf, deaf/blind, or have vision or hearing loss.

When evaluating the accessibility of a digital tool or app for students with sensory disabilities, determine whether it:

- Provides information in multiple formats (e.g., text, images, and audio).
- Provides information that is perceivable (e.g., a website with infographics that are described with alt text or a video with accurate closed captions).
- Allows the learner to make changes to the audio (e.g., turning off background music or increasing the volume) or visual presentation (e.g., adjust text size, margins, background, text colors).
- Is easy to operate with the support of assistive technology, such as a screen reader and voice control.

Communication Disability

A communication disability affects how an individual interacts with others due to an impairment in their language functioning. This may be due to a cognitive disability (e.g., Autism Spectrum Disorder) or it may not be due to a cognitive disability (e.g., stroke survivor). Students with communication disabilities may struggle to speak, read, and/or comprehend verbal information. When evaluating the accessibility of a digital tool or app for students with communication disabilities, determine whether it:

- Provides information in multiple formats (e.g., text, interactive images, virtual manipulatives, audio).
- Provides information that is understandable (e.g., uses simple language rather than academic or technical jargon; allows the user to lookup words or provides words with visual definitions).
- Enables communication through the user's body language (gestures, eye gaze, vocalizations, sign language, facial expression).
- Allows the use of pictures, symbols, letters, and/or words and phrases to create messages or respond to prompts.
- Can be easily navigated and used by individuals who have speech difficulties.

Cognitive Disability

A cognitive disability, or intellectual disability, is an impairment in mental functioning. According to WebAIM (2018), "A person with a cognitive disability has greater difficulty with one or more types of mental tasks than the average person" (para. 1). Individuals with cognitive disabilities may struggle with memory, attention, reading, problem solving, linguistic and verbal comprehension, math comprehension, or visual comprehension. Students with cognitive disabilities may struggle with learning, especially when information is presented in a single format (e.g., lecturing only).

When evaluating the accessibility of a digital tool or app for students with cognitive disabilities, determine whether it:

- Is easy to understand (e.g., navigation is logically ordered; information is clear, concise, and simple).
- Provides immediate feedback and guidance (e.g., if a form is not completely filled out, the tool signals to the user what they have to do to complete the form).
- Is well designed (e.g., does not feature distracting ads or information; uses a simple interface with lots of white space).
- For content-based apps, such as math games, provides supplementary resources, activities, and information that give students additional support for developing their knowledge and skills.

TEDx Talk: Creating an Accessible Digital Future

Watch on YouTube

Assistive Technology

Assistive technology (AT) "is any item, piece of equipment, software program, or product system that is used to increase, maintain, or improve the functional capabilities of persons with disabilities" (Assistive Technology Industry

Association, 2020, para. 3).

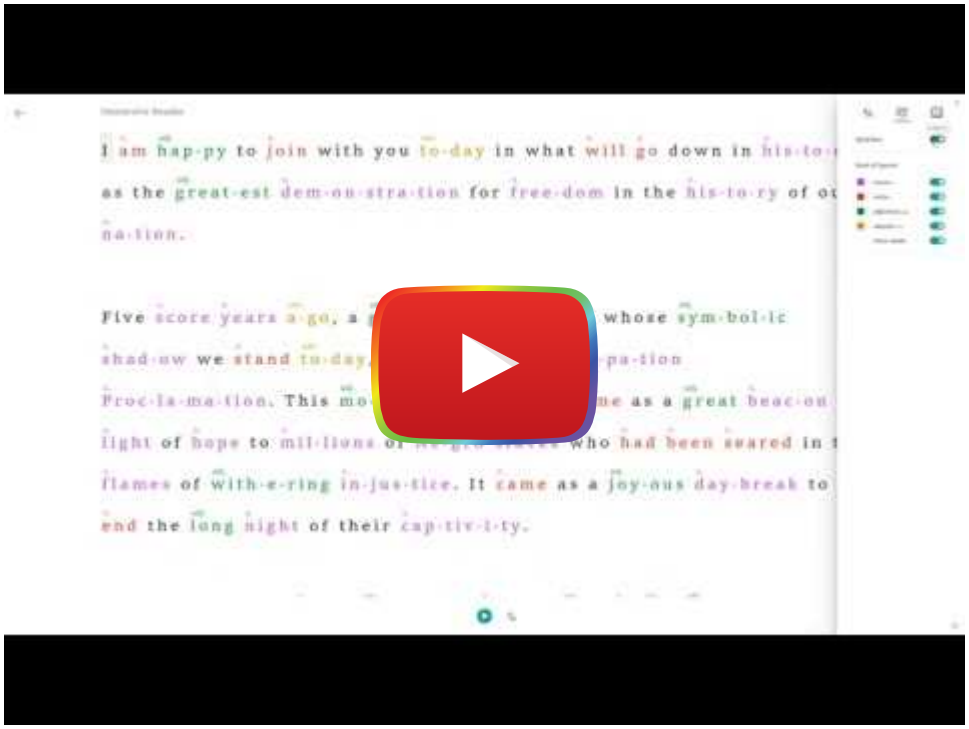
Throughout this chapter, we have mentioned multiple types of AT, including screen readers, voice control, mouth sticks, specialized keyboards, and pointing devices. If you decide to incorporate a digital tool or app that is not fully accessible into your practice, it can be helpful to know about AT devices that might allow students with disabilities to engage with the tool or app.

In the following section, we will detail a few free AT tools and extensions. Of course, there are many more AT devices available. Talking with the specialists in your school or district who work with students with disabilities is a great way to learn about AT and identify ways to reduce barriers to learning for your students.

Microsoft Immersive Reader

Microsoft Immersive Reader a digital tool that supports reading comprehension. You can copy and paste text directly into the free online version of the tool or use it in most Microsoft platforms (e.g., Word, Outlook, Edge, OneNote).

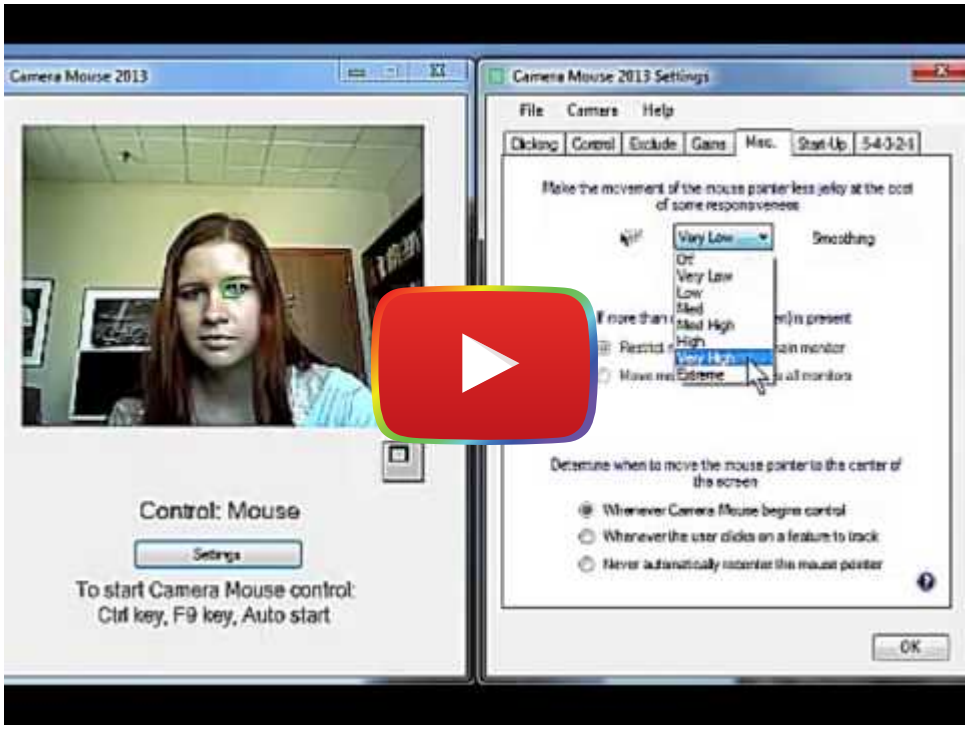
Microsoft Immersive Reader allows users to have text read aloud at different speeds. It gives users control over line spacing, font, text size, and focus. It can showcase the parts of speech and syllables. And, it features a picture dictionary and translation tool. Microsoft Immersive Reader can aid students who struggle with reading, students with cognitive disabilities, and students who are visually impaired (by reading the text aloud).



Watch on YouTube

Camera Mouse

Camera Mouse is a free downloadable software that allows the user to control the mouse pointer using the camera on their computer by moving their head. This tool is beneficial for individuals who lack the ability to control their hand movements but can control the movement of their head. According to the Camera Mouse website, "People with Cerebral Palsy, Spinal Muscular Atrophy, ALS, Multiple Sclerosis, Traumatic Brain Injury, various neurological disorders use this program and its predecessors to run all types of computer software" (para. 1).



Watch on YouTube

Voice Control

Voice Control is an accessibility tool built into Mac and iOS devices. This tool allows an individual to perform multiple tasks through their voice. They can simply speak out the activity they wish to complete, such as “open the Adobe Spark app,” or “open photos,” or “scroll up” (check out a list of Voice Control commands from Tech Talk America). Voice Control also allows users to dictate what they want to write within an app. This tool can be helpful for students who have a sensory or physical disability.

Note: There are similar tools for other operating systems, including Voice Access on Android and Windows Speech Recognition.

Watch on YouTube

Conclusion

According to the World Health Organization (2020), disability is a "complex phenomenon, reflecting the interaction between features of a person's body and features of the society in which he or she lives. Overcoming the difficulties faced by people with disabilities requires interventions to remove environmental and social barriers" (para. 2). In education, we must identify ways to **remove barriers** and **provide support** to ensure all students can succeed.

Let's go back to the scenario at the beginning—the one where you found a perfect educational video for your students, but, upon showcasing it in class, you discovered it was not accessible. Take a moment to reflect and consider, **what might you do differently now** that you have read this chapter to prevent that from happening again?

Hopefully, this chapter has inspired you to keep accessibility in mind when finding and selecting digital tools and apps for teaching and learning. In this chapter, we discussed how to use UDL principles to create accessible, equitable, and inclusive learning experiences and environments. We introduced you to the POUR model as a guide for evaluating all digital tools and apps before using them in your classroom. We also provided an overview of broad categories of disabilities and offered tips for how to evaluate digital tools and apps based on those disabilities.

The more you practice evaluating digital tools and apps, the easier it will become. While it may take time upfront to do the evaluation, it will save you the frustration of bringing a digital tool or app into the classroom that becomes a barrier to learning. Finally, take some time to learn about the assistive technology tools you might use to create a more inclusive learning experience for your students. The more time you spend focusing on accessibility and inclusive learning, the better the learning experience will be for your students.

Additional Resources

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