Technology Integration for Students with Dyslexia and Related Disorders

Information and Resources for Integrating Technology into the Classroom to Help Accommodate Students with Dyslexia and Related Disorders

TEA

Background

"One of the most important aspects of technology in education is its ability to level the field of opportunity for students."
- John King, U.S. Secretary of Education

Are, Who We. 2015. "Introduction." Office of Educational Technology. December 3, 2015. https://tech.ed.gov/netp/introduction/.

The Texas Education Code (TEC) §38.0031 mandates the development of a Classroom Technology Plan specifically designed to support students with dyslexia. This guide aims to provide educators, administrators, and stakeholders with a comprehensive understanding of the legislative requirements and the practical steps necessary to integrate effective technological solutions in the classroom. By leveraging these technologies, schools can create an inclusive learning environment that accommodates the unique needs of students with dyslexia, ultimately enhancing their educational experience and academic success.

"Children and adults with dyslexia and other learning disabilities can benefit from the instructional and compensatory strategies that technology can provide. Technology also has the potential to increase learner motivation, prolong focus, and build confidence."

- Franklin, Emily. 2020. "Overview of Instructional and Assistive Technology: Critical Tools for Students Who Struggle."

TEC §38.0031 Classroom Technology Plan for Students with Dyslexia

(a) The agency shall establish a committee to develop a plan for integrating technology into the classroom to help accommodate students with dyslexia. The plan must:

(1) determine the classroom technologies that are useful and practical in assisting public schools in accommodating students with dyslexia, considering budget constraints of school districts; and

(2) develop a strategy for providing those effective technologies to students.

(b) The agency shall provide the plan and information about the availability and benefits of the technologies identified under Subsection (a) (1) to school districts.

(c) A member of the committee established under Subsection (a) is not entitled to reimbursement for travel expenses incurred by the member under this section unless agency funds are available for that purpose.

The Committee on Technology Integration for Students with Dyslexia and Related Disorders was charged with updating the plan for integrating technology into the classroom to help accommodate students with dyslexia and related disorders. The organizational structure of this plan is as follows:

1. **Section One**: An overview of the benefits of integrating technology into the classroom to help accommodate students with dyslexia and related disorders, including research to support the plan.
2. **Section Two**: A list with descriptions of classroom technologies that are useful and practical in assisting public schools in accommodating students with dyslexia and related disorders, considering the budget constraints of school districts.
3. **Section Three**: A methodology for providing the technologies to students with dyslexia and related disorders.

Acknowledgements

Section One

An Overview of the Benefits of Technology for Students with Dyslexia and Related Disorders

TEC §38.003 defines dyslexia in the following way:

Dyslexia means a disorder of constitutional origin manifested by a difficulty in learning to read, write, or spell, despite conventional instruction, adequate intelligence, and sociocultural opportunity.

In addition, the International Dyslexia Association defines dyslexia as follows:

Dyslexia is a specific learning disability that is neurological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede the growth of vocabulary and background knowledge.

Assistive technology (AT) has shown considerable potential in supporting students with dyslexia and related disorders by enabling them to access educational content more effectively and engage more fully in the learning environment. Technology tools allow students with dyslexia and related disorders to be equal participants in school-based learning experiences (TEC §38.0031). Technology is not to take the place of direct and explicit instruction but to provide access to grade level and course curriculum. Technology also has the potential to increase learner motivation, prolong focus, and build learner confidence. The use of technology aligns with best practices in educational research (Mayer 2014).

AT allows students to complete a task that they otherwise would not be able to complete independently. For example, text-to-speech technology can be a vital tool for students with dyslexia and related disorders. AT can support various aspects of literacy by helping students gather information through reading and then express their knowledge through writing in ways that might be challenging without AT (Franklin 2020).

AT is any device that supports students with disabilities by enhancing their independence. In simple terms, it includes any piece of equipment or technology that assists with the routine aspects of life, such as work, communication, and mobility. It is distinct from instructional technology, which includes tools readily available in the classroom for use by all students. AT is provided to eligible students served under the Individuals with Disabilities Education Act (IDEA) or Section 504.

AT can be "low, mid, or high tech". The table below provides definitions and examples of each category (Iris 2023).

Type	Definition	Examples
Low-tech	Devices that are readily available and typically do not require batteries or electricity	• Pencil grip • Large font text • Raised lined paper
Mid-tech	Devices that are usually digital and may require batteries or electricity	• Calculator • Audiobook • Digital recorder
High-tech	Devices that are computer-based, have sophisticated features, and can be tailored to the specific needs of the student	• Tablet • Screen reader • Voice recognition software

Technology serves as a bridge between a student's current skills and the tasks they must perform. Its goal is to support students in skills not yet mastered by providing access to instructional and AT alongside learning strategies and targeted reading instruction. Local educational agencies (LEAs) are required to provide a student with AT or services if the admission, review, and dismissal (ARD) committee determines it is necessary to provide the student with a free and appropriate public education (FAPE) (*The Dyslexia Handbook*, 87).

To illustrate an appropriate accommodation using technology for a struggling reader, consider the following scenario: An adolescent learner who is reading below grade level is not able to decode enough complex words from his science text to read effectively, despite receiving high-quality, explicit instruction. To address this challenge, the student might use text-to-speech software to have the science text read aloud. This approach allows the learner to "read with his ears" while following along with the printed material online. When he encounters a complex vocabulary word, he can click on it to hear the pronunciation or access its definition, avoiding the need to laboriously sound out the unknown word. For a student who struggles with decoding, the combination of audio and visual reinforcement can provide sufficient support to derive meaning from the text.

Moreover, the teacher can further guide the student's understanding by encouraging them to look up the word, use an online graphic dictionary, and create a visual representation of the term. Such accommodations, when paired with quality instruction, enable the struggling reader to access grade-level material and expand their vocabulary.

As students with dyslexia and other learning disabilities progress through the grades, they spend countless hours engaging in reading and writing tasks. Technology tools help them access age-appropriate reading materials and the general education curriculum. These tools enable academic content to be read aloud, defined, translated, captured, transformed, or linked to supplementary information.

Research indicates that technology can also play a remedial role by by fostering the transfer of improved skills to other areas of learning (Mather & Wedling 2011).

 Effective selection of AT requires an understanding of the functional impact of a disability on a student's ability to perform tasks. Explore the [Texas AT Support Website](#), a vast library of essential tools and support for educators to enhance learning for students with diverse needs. You'll discover contains valuable information on how to integrate these assistive technologies effectively, including guides on selecting the right tools, training materials for both students and staff, and examples of best practices.

Using Technology to Assist with Reading

Although technology is not meant to replace quality reading instruction, it can serve as a powerful tool to support students in developing their reading skills. Tools such as text-to-speech software, audiobooks, and digital text-to-speech books allow students to hear text read aloud. This reduces the burden of decoding and allows the student to focus more on comprehension.

Devices like laptops, desktops, mobile devices, and tablets often include built-in AT features to aid with reading. Additionally, low-tech options, such as sticky notes and highlighters, can also be effective. When selecting the most appropriate technology for reading, it is crucial to consider the student's specific needs and preferences to identify the tools and supports that will best promote reading success (Reading Rockets, 2024).

Using Technology to Assist with the Writing Process

Technology can be a valuable resource for students who struggle with writing. For instance, using a keyboard can assist students who find it challenging to write with a pen or pencil, making the physical act of writing more manageable. AT can also support spelling, grammar, and the organization and expression of ideas in writing.

Commonly used tools for writing include pencil grips, dictation (speech-to-text) software, word prediction programs, spellcheck and grammar check tools, and graphic organizers. These are just a few examples of the many tools available to assist with writing tasks. Professionals such as occupational therapists, special education teachers, or AT Specialists can help identify and select the most appropriate tools for each student's unique needs (Reading Rockets, 2024).

Using Technology to Support Study Skills

Technology can be an invaluable tool in helping students succeed by enabling them to access and engage with the curriculum more effectively. Developing strong study skills is essential, and many technological options can aid in learning, building, and maintaining these skills. "Study skills" refers to the management and organization of time, materials, and information. Personalizing learning strategies is equally important, as it fosters greater independence and success. As schoolwork becomes increasingly digital, the use of technology provides students with opportunities to enhance their academic experience and achieve greater success (Burgess, 2023).

Here are some helpful tools for different aspects of supporting study skills:

Managing Time:

- Online calendars
- Homework apps
- Timers

Organizing Materials:

- Electronic checklists
- Google Drive
- Dropbox

Managing Information:

- Graphic organizers
- Note-taking templates
- Information organizers

Supporting the Research Process:

- Tools to gather and synthesize information
- Online grammar and plagiarism checkers
- Citation tools

Using Technology to Assist with Math

For students struggling with math, AT can provide substantial support. Although dyslexia is often described as an "unexpected difficulty in reading," students with dyslexia may also face challenges in math. Difficulties such as recalling math facts and completing multistep tasks are common. Additionally, these students may struggle with the physical act of writing, including copying and aligning numbers accurately.

Students with dyslexia and related disorders may benefit from AT in math, even if they do not have a specific math-related disability. When considering appropriate accommodations, schools should take into account factors such as dysgraphia, working memory challenges, and processing speed.

Some examples of technology tools for math include calculators, rulers, graph paper or digital graphing tools, manipulatives, and text-to-speech software to read aloud math word problems.

It is essential to address math difficulties with the same thoughtful and targeted strategies used for reading instruction, ensuring students receive the support they need to succeed (Assistive Technology for Math, 2019; Math Introduction, 2023).

Important Points
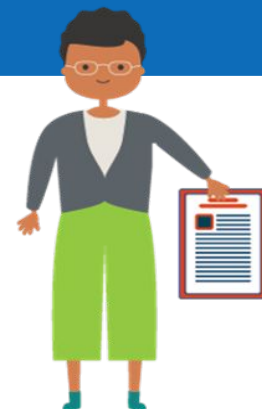
Important points to remember:

- Technology provides academic support for all students.
- Technology has a place in remediation and accommodation.
- Technology best supports students when their strengths and weaknesses are assessed before specific tools are selected.
- Technology is constantly evolving.
- Technology is not a substitute for good instruction.
- The limitations of the specific technology should be considered in decision-making.
- Technology is intended to empower students.
- Technology that is appropriate in the classroom for instructional purposes is not always appropriate for assessment purposes.

Educators should avoid teaching technology solely for the purpose of fostering technological proficiency. Instead, technology should be embraced as a tool to empower all students, including those with dyslexia and related disorders, by supporting their learning and enhancing opportunities for academic success. By enabling students with dyslexia and related disorders to use and even choose the technological tools that best suit their needs, educators can help pave the way for their continued success as lifelong learners (Jing & Chen, 2017).

Operating System Features

All computers come equipped with a variety of customizable options and settings that are built into their operating systems. These features allow users to tailor their computing experience to better suit their individual needs and preferences, which is invaluable for students identified with dyslexia or related disorders. Options, like text-to-speech, magnification, and high-contrast modes, are available to support users with disabilities. Click on the links below to learn more about operating system features for Apple, Chrome, and Microsoft.

Apple

Chrome
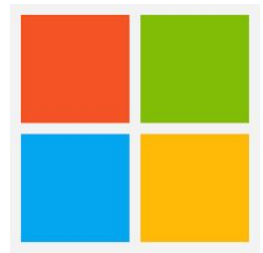
Microsoft

Section Two

Useful Technologies to Support Students with Dyslexia and Related Disorders

The following list of apps/software is not an exhaustive list nor is it a recommendation of any specific product. It is intended to provide examples of instructional resources.

Reading

- Talking Book Program (free to qualifying Texans)
  - TEC §28.006(g-2) requires school districts to notify parents of students determined to have dyslexia or a related disorder or to be at risk for dyslexia or other reading disabilities of the Talking Book Program. Students who have a visual, physical, or reading disability are eligible for the Talking Book Program.
  - The Talking Book Program provides free library services to qualifying Texans.
- Learning Ally (free to eligible students)
  - Learning Ally provides a library of audiobooks for students with a visual impairment, dyslexia, or other disabilities.
- Bookshare (free for eligible students)
  - Bookshare is an eBook library for students who have a qualifying reading or perceptual disability, a visual impairment, or a physical disability that affects their ability to read printed works.
- Texas Education Agency Accessible Materials (free to eligible students)
  - Texas has state-adopted accessible instructional materials (AIM), including braille, large print, audio, and digital materials.

Reading

- [Texas AT Support Library: Reading Resources](#)

Examples of Low-tech Help for Reading	
Plastic reading guides	Plastic strips help the reader focus on one line at a time.
Post-it notes	Post-it notes provide a tactile way to remember key ideas.
Graphic organizer	Graphic organizers are paper-based organization tools that help learners make text connections.
Word wall	Word walls displayed on classroom walls, windows, or bulletin boards help students learn new vocabulary.

*This is not an exhaustive list.

Writing

- [Texas AT Support Library: Writing Resources](#)
- [Accommodation Central: Writing Resources](#)

Examples of Low-tech Help for Writing	
Pencil grip	Pencil grips are writing aids that help improve finger positioning and pencil control.
Graphic organizers	Graphic organizers are paper-based organization tools that help learners make text connections.
Word banks	A word bank is a list of words or phrases related to a topic that students can use when writing.
Recording devices	These devices record the student's exact spoken response.
Slanted writing board	A slanted writing board is a desk or surface with an angled position that helps improve handwriting, posture, and pencil grip.

*This is not an exhaustive list.

Spelling

- Texas AT Support: Spelling
- Accommodations Central: Spelling

Examples of Low-tech Help for Spelling	
Frequently misspelled word list	This is an individualized list of a student's frequently misspelled words to support spelling.
Dictionary	Dictionaries can enhance written assignments for students who struggle with spelling and vocabulary.
Word wall	Word walls displayed on classroom walls, windows, or bulletin boards help students with spelling and vocabulary.
Sentence stems	A sentence stem is a partial sentence that provides a framework for students to complete with their own words.

*This is not an exhaustive list.

Math

- [Texas AT Support Library: Math Resources](#)
- [Accommodation Central: Math Resources](#)

Examples of Low-tech Help for Math	
Manipulatives	Manipulatives are concrete objects or pictures of objects that students touch and move to visualize abstract concepts.
Math chart	Math charts support computation of math facts and help students form a mental model of math concepts.
Number line	A number line is a visual representation of numbers in a straight line. Number lines help students understand the position of numbers and to visualize operations.
Graph paper	Graph paper provides a visual grid to align numbers and organize math problems.
Geometric tools	Geometric tools are instruments like rulers, compasses, protractors, and set squares.

*This is not an exhaustive list.

Web 2.0 Tools

Web 2.0 Tools have transformed the internet into a participatory, interactive place where users can create, collaborate, and share information, bringing new and powerful opportunities to the classroom. Students can interface via text-to-speech and screen reader by accessing a variety of resources. The following are tools that all students can use. They are beneficial for increasing content knowledge through collaboration.

- **Blogs** are interactive online personal journals regularly updated by the authors. They provide students with a platform to practice communication skills, share ideas, and engage in discussions.
- **Multimedia tools** integrate text, audio, images, animations, videos, and interactive content. Both teachers and students can use these tools to create engaging educational materials and explore subjects in depth for both learning and recreation.
- **Wikis** are collaborative platforms where users can add, modify, or delete content directly through a web browser using a simplified markup language or rich-text editor. They encourage group collaboration and shared knowledge-building. Some examples of popular wikis include:
    - **Wikipedia**: One of the most widely used wikis in education, Wikipedia is an online encyclopedia that allows anyone with internet access to edit articles on a wide variety of topics. It has millions of articles in different languages, created and edited by volunteer contributors from around the world.
    - **Fandom (formerly Wikia)**: Fandom is a platform where fans of specific movies, TV shows, games, and other media can create wikis dedicated to those topics. Fandom allows students engage in content by contributing articles about their favorite media. This is a great way for students to practice writing and learning about content creation.
    - **Wiktionary**: A collaborative online dictionary that is part of the Wikimedia Foundation, Wiktionary allows users to edit definitions, translations, and etymologies of words in multiple languages.
    - **Wikibooks**: This wiki focuses on creating open-content textbooks, which can be freely accessed and edited by users. It's a great resource for educational materials on a variety of subjects.

Classroom Uses of a Handheld Device or Tablet

The following examples are not exhaustive and do not endorse any specific product. They are intended to highlight instructional applications of mobile devices.

Handheld technology offers students quick, mobile, and flexible access to learning resources. These devices are often more affordable and accessible than permanent classroom technology, making them a practical option for schools with budgetary constraints. Below are examples of how handheld devices and tablets can be used in the classroom:

- **Language Development** - Students can use the voice recording feature to create podcasts of their work. For example, after reading a book, a student can develop a book report summarizing the story and record the report using a handheld device.
- **Lesson Review** - Students use the video feature to capture lesson examples as short video clips. These clips can be reviewed later, allowing students to revisit lessons and share insights with peers.
- **Organizational Skills** - Students can use the calendar application to organize their daily classwork and homework assignments, helping them manage their time effectively.
- **Reading Fluency** - Using the voice recording feature, students can record themselves reading aloud to improve their accuracy, reading rate, and prosody. They can listen to their own recordings or those of classmates while following along with the text.
- **Reminders** - Students set appointments and receive notifications using reminder features. These reminders can be triggered by the time of day or location, leveraging the device's Global Positioning System (GPS).
- **Video Conferencing** - Students can use video conferencing tools like FaceTime or other Wi-Fi enabled software to collaborate on homework and group projects.

Sources for AT and educational applications

The following sources provide information on AT and educational applications that may be helpful to individuals with dyslexia and related disorders.

- [Dyslexia Help Success Starts Here](#)
- [The Yale Center for Dyslexia & Creativity: Tools & Technology](#)
- [Educators Technology](#)
- [IncluEdu: 7iPad Apps for Students with Dyslexia](#)

Section Three

A Methodology for Providing Technology for Students

As the needs for AT are not always simple and straightforward, educators need a thoughtful process for selecting the best technology for students. An AT assessment may also be required. Online tools, such as the [Matching Person and Technology (MPT) Framework](#), the [Student, Environment, Tasks, and Tools (SETT) Framework](#), the [SIFTS Web-based Tool](#), and the [Quality Indicators for Assistive Technology Services](#) guide offer direction for determining appropriate technologies to accommodate students' needs.

Since technology continues to advance, educators must know where to access the most current information. One resource for accessing AT is the [Texas Technology Access Program](#). [Considering Assistive Technology (AT) in the Individualized Education Program (IEP) Process](#) is a resource guide for students served in special education. And the Texas Education Agency (TEA) has partnered with the Assistive Technology Industry Association (ATIA) to provide unlimited access to ATIA online courses for all education, support staff, and parents serving students in Texas. More information can be found on the [TEA ATIA Online Course Program Portal](#).

Technology has the potential to be one of the most powerful tools for supporting students with dyslexia and related disorders. The challenge lies in ensuring that the technology is both current and effective and that educators are adequately trained to utilize it. In a rapidly evolving technological landscape, educators must continually adapt to prepare students for the demands of post-secondary education. Therefore, training in both hardware and software is essential for teachers and students.

School districts face the dual challenge of staying at the forefront of technological advancements and providing educators with the pedagogical support needed to meet the diverse needs of all students. While assisting all students with appropriate technology is important, providing tailored technological support for students with dyslexia and related disorders is particularly critical. To ensure the availability of the most suitable and current tools for these students, school districts should consider the following steps as part of their implementation process.

Attend Trainings

Attend trainings on the benefits of technologies in supporting students identified with dyslexia.

Create an Inventory of Resources

Create an inventory of resources to determine what purchases have been made, including both hardware and software.

Identify Gaps in Technology

Identify gaps in technology so that districts can determine what technologies they already have and what new technologies should be purchased.

Conduct Research

Conduct research and visit other schools to gain the latest information, best practices, and successful strategies for using technology with students.

Evaluate Technologies

Evaluate technologies that will support students with dyslexia and related disorders in accommodating their learning differences. Teachers from all content areas should be involved in this step of the process, as many of the challenges for students with dyslexia and related disorders come in reading content-rich text.

Ensure Pedagogical Support

Ensure pedagogical support for teachers to meet the needs of students.

Match the Needs of Identified Students

Match the needs of identified students with the appropriate technologies so that students with dyslexia and related disorders have technological access across all content areas.

Ensure that Teachers Receive Training on Chosen Technology

Ensure that teachers are thoroughly trained in the use of the technology chosen, including the various features of technology that are already available to them (i.e., word processing tools, tablets, and smartphones). In addition to the challenge of staying current with new technologies, educators must also be able to evaluate technology and determine an appropriate implementation plan. They must discern whether a particular technology is a good match for a particular student. Selecting suitable tools in any field is a challenge, but perhaps more so in the field of dyslexia and related disorders, where student needs are so varied.

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