



Foundations of Special Education

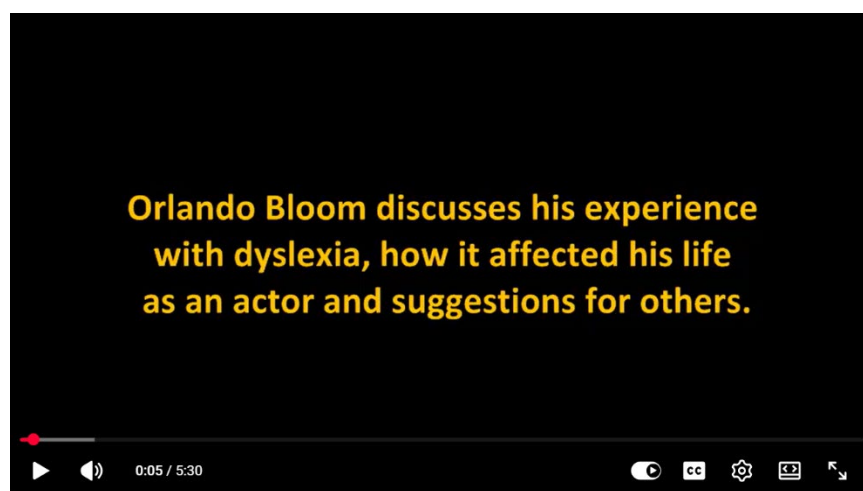
By Dr. Kathleen VanTol

Chapter 5: Learning Disabilities

Listen to Orlando Bloom, a British actor, talk about living with dyslexia. He says,

“Dyslexia is not due to a lack of intelligence; it’s a lack of access.

It’s like, if you’re dyslexic, you have all the information you need,
but find it harder to process.”



Video: Freedom of Speech Ltd. (2014). *Orlando Bloom and dyslexia – His experience, thoughts & advice*.

YouTube. <https://www.youtube.com/watch?v=hLTSPmoH2eE&t=5s>

Introduction

It is common for children to struggle at times when learning academic skills such as reading, writing, or mathematics. Usually, these difficulties can be overcome with additional support, such as tutoring or a few weeks of targeted small-group instruction from the classroom teacher. However, when these challenges persist over time despite appropriate instruction and intervention, they may indicate the presence of a learning disability. Learning disabilities are among the most common disabilities encountered in

schools and affect millions of children and adults worldwide. Because learning disabilities affect how a person processes certain types of information, academic performance may not accurately reflect a student's intellectual potential. It is important for educators to remember that although these students may experience significant challenges in reading, writing, or mathematics, a learning disability affects how they learn, not how much they are capable of learning. With effective instruction, appropriate accommodations, and timely intervention, they can achieve meaningful success in school and beyond.

Our understanding of learning disabilities has changed dramatically over the past several decades. The idea that a student could have average or above-average intelligence while also experiencing significant difficulty in one or more academic areas was not widely recognized until the 1960s. Samuel Kirk first publicly used the term learning disability in 1963 to describe this type of learning challenge ([LDA, 2023](#)). Prior to this, students with learning disabilities were often described using terms that reflected the limited understanding of learning disabilities at the time, such as word blindness, minimal brain dysfunction, and perceptual handicap. Many received little or no specialized instruction, while others were inappropriately placed in programs designed for students with intellectual disabilities. As research in this area led to a greater understanding of how the brain works and the learning challenges these students face, educators began to develop instructional approaches specifically designed to address the unique educational needs of these learners.

This chapter explores the characteristics of specific learning disabilities, including how they are defined and identified under IDEA, the role of information processing in learning, and the academic characteristics associated with learning disabilities in reading, writing, and mathematics. It also examines current approaches to identification, instructional strategies, accommodations, and educational placement while emphasizing the importance of early intervention, evidence-based instruction, and high expectations for all learners.

Definition



When a person has a learning disability, the information moving through the brain is slowed or sidetracked

– much like encountering a detour due to road construction or a traffic jam.

Getting to the destination may not be as fast or efficient as a typical route.

Image: Kovshovlk, A. (2023, October 30). Keep right. Pexels.com (CC free to use).

IDEA defines a **specific learning disability** as:

Specific learning disability means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. Specific learning disability does not include learning problems that are primarily the result of visual, hearing, or motor disabilities, of intellectual disability, of emotional disturbance, or of environmental, cultural, or economic disadvantage (IDEA, 2018).

While the IDEA definition describes the characteristics of a specific learning disability, it does not address why these learning difficulties occur. However, current research

indicates that a learning disability is a neurological disorder, specifically an information processing disorder ([LD OnLine, 2024b](#)). The brain of the child with a learning disability is not damaged, but rather it processes information in a different manner than the brain of a child who does not have a learning disability. Brain studies show that information travels through the brain of a child with a learning disability along a less efficient path than the path it typically takes through the brain of a child without a learning disability. This longer, more laborious trip through the brain can negatively impact the learning outcome ([Shaywitz & Shaywitz, 2020](#)).

Information processing refers to the cognitive process by which a learner discovers, uses, and remembers information. Information processing is intrinsic to the work of learning. This process can be broken down into five related skills: [attention](#), [memory](#), [organization](#), [metacognition](#), and [processing speed](#).

- **Attention** is the ability of the learner to maintain focus on the area of interest while ignoring other distractions. As children grow and develop their abilities, they are able to sustain that attention for an increasing amount of time and even learn to shift attention between two or more targets of interest.
- **Memory** is the operation by which information from these learning targets is encoded and stored in the brain for later retrieval.
- **Organization** is the method of categorizing information that comes into the brain and connecting it to previously mastered knowledge. As learners develop better methods for organizing their thinking, they improve the efficiency with which they can store and retrieve this information.
- **Metacognition** is the ability to think about one's own thinking, select effective learning strategies, monitor understanding, and adjust learning strategies when needed.
- Finally, **processing speed** refers to how quickly a child can think. A child's processing speed typically increases greatly during elementary and middle school before leveling off in late adolescence. Repeated practice of a skill will also improve processing speed, resulting in automaticity.

All of these tasks are part of the cognitive activity of information processing. For the child with a learning disability, difficulties with certain types of academic learning are symptoms of their impairment in processing the corresponding types of information.

Every day, learners gather information about the world through their senses. This information is sent to the brain, where it is processed, interpreted, and either used immediately or stored for future retrieval. A person can have difficulties with processing information from any of their senses, but the two critical areas of information processing that have the greatest effect on academic success are visual processing and auditory processing. It is important to note that these difficulties are not the result of a hearing impairment or a visual impairment. Instead, they result from inefficient processing of visual or auditory information. These processing difficulties become evident when students are asked to complete tasks that rely on visual or auditory discrimination, sequencing, or memory, depending on the type of processing that is affected. Examples of these challenges include distinguishing between similar letters of the alphabet, discriminating between similar speech sounds, remembering how to spell words that do not follow regular spelling patterns, and reversing the order of numbers, letters, or words when completing reading, writing, or mathematics tasks.

Different parts of the brain are used to process different types of input. When a child has a learning disability, the processing that occurs in the part of their brain corresponding to their disability is affected. The information moving through this part of the brain may move more slowly or less efficiently, much like when there is a traffic jam on the road through town. You can avoid the traffic jam by taking a detour, but the detour is not as fast or direct as your typical route. In the same way, for the child with a learning disability, some types of information will be learned rapidly and easily, while other types will “hit a traffic jam” and require much more time and effort to learn. One consequence of these less efficient processing pathways is reduced processing speed, which is the rate at which a learner can receive information, think about it, and formulate a response. As illustrated by the traffic jam analogy, tasks that rely on the affected processing system require more time and

effort. This is why extended time is an appropriate accommodation for many students with learning disabilities.

Prevalence

Estimates indicate that approximately 10% of people have a specific learning disability ([Butterworth & Kovas, 2013](#)). The most common is [dyslexia](#), which impacts the process of learning to read. Many children with dyslexia also struggle with [dysgraphia](#), difficulty with the skill of writing, and [dysorthographia](#), difficulty with spelling. It is estimated that, overall, 5-15% of children and adults struggle with reading, writing, and spelling as a result of having dyslexia ([LD OnLine, 2024a](#)). The next most common academic learning disability is [dyscalculia](#), or difficulty with math skills. Dyscalculia is not as well-known as dyslexia and it has not been as extensively researched; however, it is estimated that between 5-10% of people have dyscalculia ([Understood, n.d.b](#)). The two disabilities are not mutually exclusive, and some students will have both dyslexia and dyscalculia. Finally, consistent with the IDEA definition, these learning difficulties must not be due primarily to a visual, hearing, motor, or intellectual disability, emotional disturbance, or economic disadvantage.

A less well-known area of learning difficulty is a [nonverbal learning disability](#) (NVLD). Some children demonstrate significant challenges with visual-spatial processing, organization, and social skills and have been described as having a nonverbal learning disability. However, NVLD is not currently recognized as a distinct disorder in the [Diagnostic and Statistical Manual of Mental Disorders \(DSM-5-TR\)](#), and there is not yet professional consensus regarding whether it represents a separate disorder or how it should be defined. Similarly, IDEA does not recognize nonverbal learning disability as a category of specific learning disability for special education eligibility. Nevertheless, students who experience significant impairments in these areas may qualify for special education services under another disability category because many of the characteristics associated with NVLD overlap with those of other recognized disabilities. For example, a student whose primary difficulty is organization may also meet the criteria for attention-

deficit/hyperactivity disorder (ADHD), a student with significant visual-spatial difficulties may qualify as having a specific learning disability in mathematics, and a student whose primary challenges involve social interactions and communication may meet the criteria for autism. Whether this is because nonverbal learning disability is highly comorbid with these other conditions or because these children are simply misdiagnosed is unclear at this time and more research is needed in this area ([Miller, 2026](#)).

Identification

A learning disability is a life-long condition. However, receiving a diagnosis of a specific learning disability is not sufficient evidence for a child to qualify for special education. The child may have developed sufficient coping skills or may have received sufficient remediation to compensate for their disability and may not need special education to be able to make progress in the general education curriculum. In this situation, the child would no longer exhibit the severe discrepancy between their cognitive ability and their academic achievement that is necessary to qualify for special education under the discrepancy model. According to [Understood](#), an organization in the United States that supports people with learning and thinking differences, most states now use a **Multi-Tiered Systems of Support (MTSS)** model to identify students with a learning disability rather than a **discrepancy model**. However, it must be noted that a child will not qualify for special education under either model if he or she is making reasonable progress through the general education curriculum. Only if the child is falling behind academically, and targeted intervention has not been sufficient to remediate this situation, will a child with a learning disability qualify for special education services. It is also important to remember that while the discrepancy model is no longer mandated by IDEA and has largely been replaced by the MTSS model, the discrepancy model can still be used. Under the discrepancy model, the child must have a significant difference between their achievement in one or more academic areas and the estimate of what that achievement should be based on assessments of their intelligence, generally an IQ test.

Causes

Research into the causes of learning disabilities is ongoing, with current studies focusing particularly on the role of genetics and brain development. Given the documented differences in how the brains of individuals with learning disabilities process information, it does appear that heredity plays a role. Brain imaging studies have consistently identified differences in the brains of individuals with learning disabilities in the regions of the left hemisphere that are involved in language processing, specifically the left temporal lobe ([Shaywitz & Shaywitz, 2020](#)). Although genetics appear to play a major role in the development of learning disabilities, environmental factors before, during, and after birth can also influence brain development and increase the likelihood of learning disabilities. Children who are born prematurely, have a low birth weight, experience oxygen deprivation during birth, or are exposed prenatally to drugs or alcohol are at increased risk. Childhood malnutrition and exposure to environmental toxins, such as lead, have also been associated with learning disabilities. Understanding these risk factors can help educators and healthcare professionals support prevention efforts and identify students who may benefit from early intervention.

Learner Characteristics

Approximately one-third of all students receiving special education services are identified as having a specific learning disability. When students identified with specific learning disabilities are combined with those served under the category of Other Health Impairment, which includes many students with attention-deficit/hyperactivity disorder (ADHD), they account for nearly half of all students receiving special education services. Most of these students are initially referred for evaluation by a general education teacher, making it essential that classroom teachers recognize the early signs of learning difficulties. One of the greatest benefits of MTSS is its emphasis on identifying struggling learners early, allowing educators to provide targeted interventions before students experience repeated academic failure.

Signs of a potential learning disability include difficulty learning the letters of the alphabet and learning to connect letters to their corresponding sounds. This difficulty with learning the rules governing alphabetic sound-symbol correspondence, also known as **phonological awareness**, is thought to be at the root of dyslexia for many children ([Shaywitz & Shaywitz, 2020](#)). This may first show up in young children as trouble with distinguishing rhyming words and producing rhymes. School-aged children with dyslexia may read slowly, hesitate, repeat, omit, or substitute words when reading aloud. The student may also struggle with reading comprehension, possibly as a result of the **dysfluency** when reading or because of a failure to use metacognitive strategies to monitor understanding of what is being read. These students may also have messy handwriting, difficulty with spelling, and problems when required to express ideas in writing.

Some students with specific learning disabilities in math will struggle with basic math computation skills. Others may struggle with mathematical concepts such as spatial relationships, time, money, negative numbers, decimals, and fractions. Similar to the difficulties children with dyslexia have learning letters and connecting letters with their sounds, students with a math learning disability may misread numbers, get math symbols mixed up, and have trouble matching numbers to their quantities. This disability may first show up in young children as a difficulty with reproducing patterns and completing sequencing tasks ([Frye, 2019](#)). These students may also struggle with problem solving, which can have far reaching effects

Because the characteristics of a learning disability are not always obvious, they are sometimes mistaken for a lack of motivation, poor effort, or an attention disorder. The learning challenges experienced by students with learning disabilities are directly related to the information-processing differences discussed earlier in this chapter. As a result of these challenges, students with learning disabilities may have difficulty attending to relevant information, encoding and organizing it for efficient storage and retrieval, selecting and using effective learning strategies, monitoring their own learning, and developing the automaticity that typically results from repeated practice.

These information-processing differences can affect performance in many academic areas. For example, they may not hear slight differences between words or between letter sounds, may mispronounce or substitute words when reading, have trouble organizing their writing, not be able to put story elements into the correct sequence, and may fail to generalize their learning. Some children may also experience delayed language development or have a more limited vocabulary than their peers. Some students with learning disabilities also experience challenges with organization, following directions, or social interactions, characteristics that may overlap with those seen in attention-deficit/hyperactivity disorder (ADHD). Because of this overlap, learning disabilities are sometimes mistaken for attention disorders. However, careful evaluation can distinguish between these conditions, and some students meet the criteria for both disorders.

Placement

Most students with learning disabilities spend a large portion of their school day in the general education classroom. Full inclusion is commonly defined as spending at least 80% of the school day in general education and less than 20% receiving services in a separate special education setting. Although IDEA does not specifically define the term full inclusion, the U.S. Department of Education reports educational placement using categories based on the percentage of time students spend in general education. The category that includes students who spend 80% or more of the school day in general education is widely used by researchers and policymakers as an indicator of an inclusive placement ([Office of Special Education Programs, 2020](#)). Special education services for students with learning disabilities are typically provided through a combination of push-in support within the general education classroom and pull-out instruction in a resource room. Depending on individual student needs, these services may be delivered individually or in small groups of learners with similar instructional goals. The special education teacher is responsible for overseeing the student's IEP goals, providing specialized instruction, monitoring progress, and collaborating with the general education teacher and

any classroom paraprofessionals to ensure that the student's educational needs are effectively met.

Strategies



People with learning disabilities benefit from multisensory methods of instruction that include visual, auditory, kinesthetic, and reading/writing learning opportunities.
Image: Preply.com. (2021, November 8). *Four types of learning styles*. Flickr (CC-BY 2.0)

Students with learning disabilities benefit from structured learning environments and clearly established routines and expectations. These supports help address some of the challenges associated with attention, organization, and metacognition that many students with learning disabilities experience. A well-organized classroom with consistent routines can also help increase students' independence and likelihood of success. Even with these supports in place, however, some students may continue to need additional assistance and direct instruction in developing organizational and self-management skills such as keeping their desk, locker, backpack, and learning materials organized.

Research has shown that students with learning disabilities benefit from multisensory instructional approaches. [Multisensory methods](#) engages learners through more than one sensory modality, increasing the likelihood that information will be processed,

retained, and recalled. Rather than using an instructional method that relies on only one type of input, usually either auditory or visual, students benefit from instruction that combines auditory and visual input with opportunities for tactile and kinesthetic learning. For example, students learning letter-sound relationships might trace a sandpaper letter while saying the letter name and sound aloud. In mathematics, students can use manipulatives to model word problems before drawing a picture and writing the corresponding equation ([Morin, n.d.](#)). We will explore multisensory learning further in a later chapter.

In addition, students with learning disabilities benefit from frequent, timely feedback that reinforces accurate learning. For the best impact on learning, this feedback should be provided as soon as possible after the student's response. It is helpful to remember that practice does not make perfect, rather practice makes permanent. In other words, the skills and responses that students practice repeatedly are the ones they are most likely to retain. Providing immediate corrective feedback helps ensure that students practice accurate responses. In addition to corrective feedback, positive reinforcement can increase motivation, persistence, and students' sense of accomplishment.

Students with learning disabilities also benefit from direct instruction. This evidence-based approach uses explicit, systematic, step-by-step teaching with frequent opportunities for guided practice, error correction, and checks for mastery before introducing additional skills. As students become more proficient, teacher support is gradually faded while students continue practicing with increasingly varied examples and more complex opportunities for application. Previously learned concepts are systematically reviewed to promote maintenance and long-term retention. Direct instruction can be used to teach both academic and functional skills and is considered a best practice for supporting students with learning disabilities. This instructional approach will be explored in greater detail in a later chapter. Together, timely feedback, positive reinforcement, and systematic direct instruction can help students develop accurate, efficient, and lasting learning.

In addition to providing effective instruction, teachers should explicitly teach students how to become more independent learners. Students with learning disabilities often benefit

from direct instruction in metacognitive strategies because metacognition is an area of difficulty for many of these learners. One effective approach is to teach students to use self-instruction by showing them how to talk themselves through the steps needed to complete a task. Initially, the teacher models the self-instruction statements while the student repeats them aloud. As the student's confidence and independence increase, the teacher gradually withdraws the verbal model, prompting only as needed while the student independently verbalizes each step. Finally, the self-instruction strategy is faded from overt speech to whispering and eventually to silent, internal self-talk. Other effective metacognitive strategies include self-questioning and self-monitoring. These strategies help students evaluate their understanding, monitor their progress, and make adjustments as needed to regulate their own learning ([IRIS Center, 2017](#)).

Another important step in developing independent learners is teaching students to use effective learning strategies. Strategies that actively engage students with the material, provide a systematic approach to acquiring and remembering information, and encourage them to monitor their own learning can help them become more purposeful and effective learners. In other words, these strategies help students learn how to learn. Different learning strategies are effective for different types of tasks and content areas, so students should be taught a variety of approaches and when to use each one. One common learning strategy is the use of [mnemonics](#) to improve memory for facts and procedures.

Mnemonics are especially helpful when information must be remembered in a particular sequence, such as the examples shown below for remembering the order of operations in mathematics or the planets of the solar system. The more meaningful, memorable, or even humorous a mnemonic is, the more likely students are to remember it.

Mnemonic for the order of operations in math:

PEMDAS: Please Excuse My Dear Aunt Sally and Let her Rest.

Parentheses, Exponents, (Multiplication, Division), (Addition, Subtraction) –
from Left to Right

Mnemonic for the order of planets in the solar system, starting closest to the sun.

My Very Energetic Mother Just Served Us Nachos

Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune

Accommodations

In addition to remedial instruction, many students with learning disabilities benefit from accommodations that provide access to the curriculum while they continue developing their academic skills. Students who struggle with reading may benefit from audiobooks, a test reader, or text-to-speech software. They may also benefit from reading materials that address the same content as those used in the general education classroom but are written at a more accessible reading level. Students with written language difficulties may benefit from copies of class notes, a scribe, or speech-to-text software. They may also need explicit support with planning and organizing written assignments. Learning to use word processing and word prediction software can further increase independence and support development of written language skills. For younger students who struggle with handwriting, raised-line paper and pencil grips may also be helpful. Students with mathematics disabilities may benefit from manipulatives, calculators, and math fact charts. They may also benefit from access to mathematical formulas and explicit instruction in strategies for solving word problems and completing mathematical procedures. Accommodations are not intended to lower learning expectations. Rather, they remove barriers so that students can demonstrate what they know while continuing to receive instruction that addresses their areas of need.

Kristen's Story: A Learning Disability in Reading

Ever since I can remember, I have struggled in the area of reading. In elementary school, when my classmates were reading “big” chapter books, I was still being given simple books and, even with these simple books, I would still mix up the words that I was reading. When I was in third grade, my family had me evaluated

and I qualified for special education services as a student with a learning disability in reading.

As a student I was embarrassed to be on an IEP. I had many friends at school, in sports, at church, and so many more places. I didn't want them to know that I struggled with reading. I was able to be with my general education class for the majority of the day, but I was pulled out regularly to get extra help for reading. My IEP also gave me accommodations for taking tests outside of the classroom and for getting my tests read to me as well. These are accommodations that really helped because of my disability, but that I also struggled to accept because of my embarrassment. I wondered if I would ever be a good reader.

Throughout elementary, middle, and early high school, I worked on my reading skills. I was still behind my classmates, but I tried very hard to continue to develop my skills. During my sophomore year of high school, I was evaluated again and this time I was put on a 504 plan rather than an IEP. I no longer needed to be pulled out for special education services. This gave me the hope that my reading was developing and helped me to believe that I could go to college, get a job, and be successful even with a learning disability.

As part of one of my classes in my senior year of high school, I had the opportunity to help students in my school who had severe disabilities. I was able to be an assistant in their special education classroom and I got the chance to help them with simple learning activities like matching, as well as with behavior needs, social skills, and other life skills tasks. I fell in love with working with these students and I knew this was my calling. I was determined that this would be the focus of my future studies in university and eventually my future job.

When I decided this, people who knew about my reading disability questioned my ability to complete all the paperwork that needs to be done as a special education teacher, but I knew I could do it. With my ambitions set high, I ended up graduating with a degree in special education in four and a half years with a 3.7 Grade Point Average (on a 4-point scale). I now have a job as a special education teacher. I

teach kindergarten through 3rd grade students who have autism and are non-verbal. I am also working on getting my master's degree in special education.

I still have my challenges with reading, and it may never be something that I am great at, but through this journey I have been able to accept that I was a student with an IEP and a learning disability, but I was also a student who worked hard to increase my reading skills, graduate high school, graduate university, and get my dream job as a special education teacher.

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Conclusion



The future for students with learning disabilities is a bright one.

Image: A125.Studio Studio. (2021, May 20). *Boy with curly hair writing in his blue notebook*. Pexels.com (CC free to use).

A learning disability affects how a student learns, not how much the student is capable of learning. Although students with learning disabilities may require specialized instruction, accommodations, and additional time to master academic skills, they are capable of making meaningful progress and achieving success in school and beyond. With early identification, evidence-based instruction, and appropriate supports, students with learning disabilities can develop the knowledge, skills, and confidence needed to reach their goals.

Notice and Reflect Challenge

Observe a classroom, tutoring session, or your own learning during the coming week.

Notice how teachers, or you yourself, use strategies such as structure, feedback, explicit instruction, multisensory instruction, accommodations, or learning strategies to support learning. Pay particular attention to how these strategies help learners pay attention, organize information, remember new concepts, monitor their understanding, and complete academic tasks.

Reflect

- Which instructional strategy had the greatest impact on learning?
- How did this strategy support one or more aspects of information processing (attention, memory, organization, metacognition, or processing speed)?
- If you were teaching a student with a learning disability, how might you adapt or extend this strategy to better support the student's learning?

Glossary

- **Attention.** The ability of a learner to maintain focus on the area of interest while ignoring other distractions
- **Comorbid.** The presence of two or more distinct conditions occurring in the same person at the same time.
- **Discrepancy model.** A way to compare a student's scores on different types of tests and to notice where there are significant differences between multiple assessment tools.
- **Dyscalculia.** Difficulty with math skills.
- **Dysfluency.** Difficulty with speaking.
- **Dysgraphia.** Difficulty with the skill of writing.
- **Dyslexia.** Difficulty with reading.
- **Dysorthographia.** Difficulty with spelling.

- **Metacognition.** Thinking about thinking. It is necessary for monitoring one's own learning.
- **Memory.** The way in which information is encoded and stored in the brain for later retrieval.
- **Mnemonics.** These memory tools help people remember information more easily by linking complex facts and long lists to acronyms, rhymes, songs, or mental images.
- **Multisensory methods.** Instructional methods that incorporate auditory, visual, tactile input, and movement.
- **Multi-Tiered System of Support (MTSS).** A multi-tiered system of supports (MTSS) is a framework that schools use to identify students who are struggling and intervene quickly. The 3 Tiers typically include whole class instruction, targeted interventions with small groups, and intense individualized support.
- **Nonverbal learning disability.** Difficulty with visual-spatial, organizational, or social skills.
- **Organization.** The method of categorizing information that comes into the brain and connecting it to previously mastered knowledge.
- **Phonological awareness.** Difficulty with learning the rules governing alphabetic sound-symbol correspondence.
- **Processing speed.** Refers to how quickly a person can think.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. (5th ed.). American Psychiatric Association.

Butterworth, B. & Kovas, Y. (2013, April 19). Understanding neurocognitive developmental disorders can improve education for all. *Science*, 340(6130), 300-305.
<https://doi.org/10.1126/science.1231022>

Frye, D. (2020, August 3). *What is dyscalculia? Math learning disability overview*. ADDitude. <https://www.additudemag.com/what-is-dyscalculia-overview-and-symptom-breakdown/>

Individuals with Disabilities Education Act. (2018, May 25). Sec. 300.8 (c) (10). U.S. Department of Education. <https://sites.ed.gov/idea/regs/b/a/300.8/c/10>

The IRIS Center. (2017). *High-quality mathematics instruction: What teachers should know. Metacognitive strategies*. IRIS Center, Vanderbilt University. <https://iris.peabody.vanderbilt.edu/module/math/cresource/q2/p07/>

LD OnLine. (2024a). *Dyslexia: What brain research reveals about reading*. LD OnLine. WETA. (Original work published in 2004). <https://www.ldonline.org/getting-started/ld-basics/what-learning-disability>

LD OnLine. (2024b). *What is learning disability?* LD OnLine. WETA. <https://www.ldonline.org/getting-started/ld-basics/what-learning-disability>

Learning Disabilities Association of America (LDA). (2023). *60 years of learning disabilities advocacy: Celebrating progress, inspiring change* [Video]. <https://ldaamerica.org/60-years-of-learning-disabilities-advocacy-celebrating-progress-inspiring-change/>

Miller, C. (2026, February 9). *What is nonverbal learning disorder (NVLD)?* Child Mind Institute. <https://childmind.org/article/what-is-non-verbal-learning-disorder/>

Morin, A. (n.d.). *What is multisensory instruction?* Understood. <https://www.understood.org/en/articles/multisensory-instruction-what-you-need-to-know>

Individuals with Disabilities Education Act. (2007, October 30). Sec. 300.8 (c) (10): *Specific learning disability*. U.S. Department of Education. <https://sites.ed.gov/idea/regs/b/a/300.8/c/10>

Office of Special Education Programs. (2020). *IDEA Part B child count and educational environments for school year 2019–2020: OSEP data documentation*. U.S.

Department of Education.

<https://www.ed.gov/sites/ed/files/programs/osepidea/618-data/collection-documentation/data-documentation-files/part-b/child-count-and-educational-environment/idea-partb-childcountandedenvironment-2019-20.pdf>

Rosen, P. (2026, June 10). *What is MTSS? A guide to the multi-tiered system of supports in schools*. Understood. <https://www.understood.org/en/articles/mtss-what-you-need-to-know>

Shaywitz, S., & Shaywitz, J. (2020). *Overcoming dyslexia* (2nd ed.). Vintage Books.

The Understood Team. (n.d. a) *The discrepancy model: What you need to know*. Understood. <https://www.understood.org/en/articles/the-discrepancy-model-what-you-need-to-know>

The Understood Team. (n.d. b) *What is dyscalculia?* Understood. <https://www.understood.org/en/articles/what-is-dyscalculia>

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Recommended citation

VanTol, K. (2026). *Foundations of special education* (3rd ed.). Dordt University. <https://manifold.open.umh.edu/projects/foundations-special-education>



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