Understanding Learning Disabilities - How Processing Affects Learning

A chart designed to be used for starting points to think, plan and support programming in response to a student's assessed areas of strength and/or need

Definition

Phonological Processing

Phonological Processing: Refers to the use of phonological information, especially the sound structure of oral language, in processing written and oral information. Two key parts of phonological processing are phonological awareness and phonemic awareness. *Phonological awareness* is the awareness that spoken language can actually be broken down into smaller parts. *Phonemic awareness* is the knowledge that words can be broken into individual sounds (phonemes). This knowledge is critical to being able to make sense of how letters and sounds are combined in reading and writing.

Language

Language Processing: Language can be divided into comprehension and expression across all of its domains – oral, non-verbal, reading and writing – any of which can be affected in individuals with LDs. Language is part of all aspects of our experience; it is essential for expressing ourselves, addressing our needs and connecting with others.

Visual-motor Skills

Visual-motor Skills: refers to the ability to co-ordinate the eyes and hands to produce/guide physical movements such as the production of written work.

A deficit in this area can make it difficult to co-ordinate small or large movements, such as copying information from the blackboard or catching a ball while running.

Visual-spatial (perceptual) Skills

Visual-spatial (perceptual) Processing: refers to the ability to organize visual information into meaningful patterns.

Visual-spatial processing deficits can show up as problems understanding and making sense of visual information, e.g. figure-ground discrimination, perceiving constancy despite changes in context, or the perception of spatial relationships between objects.

Possible Signs

Phonological Processing

Students may have difficulty:
- Identifying rhyming words
- Making rhyming words
- Breaking a word into chunks (i.e. syllable segmentation)
- Clapping the number of words in a sentence
- Separating sounds in words (e.g. s-t-o-p)
- Blending sounds to make words
- Remembering sounds in spoken and written words
- Connecting their sound awareness to their sound-symbol knowledge

What you may see: student has difficulty with rhyming, does not hear differences in sounds, has difficulty knowing that 'plate' without the /p/ would make 'late', has difficulty spelling phonetically and has difficulty learning to read despite numerous teaching opportunities.

Language

Students may have difficulty:
- Understanding and expressing vocabulary
- Following and giving directions
- Comprehending and using word order and grammar in sentences
- Understanding and producing stories and conversations
- Understanding and expressing factual and abstract information, humour, figurative language and nuances
- With verbal and non-verbal social communication
- With reading and writing

What you may see: student may appear as if he/she isn't paying attention when he/she actually cannot understand the language of the instructions; may look dazed or uninterested; may look confused and respond with an out-of-context remark; may use brief, fragmented sentences and have difficulty verbally expressing/communicating his/her ideas; may have a delayed pause before responding; may take a literal interpretation to social interactions.

Visual-motor Skills

Students may have difficulty:
- Copying accurately
- Responding quickly on motor tasks
- Coordinating where their body is in space
- With pencil grip
- Cutting, colouring and tracing
- With hand-eye co-ordination (e.g. difficulty with mazes, dot-to-dot/tracing)
- Writing for extended periods of time
- With motor clumsiness, learning new movements in physical education classes (e.g. dribbling a basketball or volleyball serve)
- Placing letters on lines
- Making good use of space on paper

What you may see: written work is slow, difficult and laborious. Student may try to avoid written tasks even though he/she is able to understand what is expected and is able to share information orally.

Visual-spatial (perceptual) Skills

Students may have difficulty:
- Remembering and telling the difference between left and right
- Understanding visual patterns
- Understanding how parts fit together to make a whole
- Estimating or comparing visual lengths and distances
- Remembering letter formations and letter patterns
- Knowing how to use transitional words appropriately (e.g. first, then)
- Picking out important visual details
- Reading or working with charts, maps, tables, graphs and pictures to extract the needed information
- Arranging materials in space, such as in their desks, lockers, or rooms at home
- Noticing visual details
- Copying information from far-point, like the blackboard or from near-point, like texts
- Organizing space on a page
- Organizing materials and assignments
- Reading and accurately interpreting social and body cues

What you may see: student may write messily, misjudge social cues, get lost easily, appear to be clumsy, and/or bump into walls.

Instructional Strategies

Phonological Processing

- Provide clapping, rhymes, word patterns, singing and chanting to build student's awareness of the parts of words and sentences
- Provide direct instruction in combining sounds and small words into bigger chunks (e.g. cow+boy=cowboy)
- Use visual sequences (e.g. manipulatives to represent sounds)
- Provide visual prompts (e.g. cover chunks of words)
- Consider use of multi-sensory methods to develop sound/symbol association (e.g. visual auditory, kinesthetic-tactile senses)

Language

- Use prior knowledge to teach new vocabulary
- Provide definitions for new terms and concepts before teaching the lesson
- Use modelling to teach concepts
- Present information using a variety of visual and concrete formats
- Keep the language of instruction as simple as possible
- Paraphrase questions using more simple language
- Teach the student to repeat directions and to ask for clarification if needed
- Teach the student to create a visual image of what is heard
- Teach new vocabulary in the context of information that the student already knows on the topic (prior knowledge)
- Explicitly teach and model reading and writing skills
- Teach written language skills (e.g. how to write expository, argumentative, persuasive essays)
- Provide concrete examples with main features identified as models to follow; teach the use of an editing checklist which includes making a plan, organizing ideas into paragraphs, vocabulary words to use, grammatical structure and ways of concluding
- Teach the student to understand and look for indicators of feelings and other non-verbal information

Visual-motor Skills

- Allow the option of printing or cursive writing or typing
- Allow for larger printing or writing
- Provide photocopied notes
- Use word processing or speech to text software
- When copying is required, do not require speed
- Avoid large amounts of written work
- Consider teaching keyboard skills
- Break down complex motor tasks into parts for instruction
- Use student's strengths to support instruction (e.g. describe with language in addition to modelling/demonstrating expectations)
- Have the student master parts of complex motor sequences before combining movements in a fluid pattern (e.g. ensure the student can grasp and hold the ball before throwing it)
- Provide extra practice for new motor skills (e.g. learning to dribble the basketball, or serve the volleyball, including printing and cursive writing)

Visual-spatial (perceptual) Skills

- Pair visual concepts and information with verbal explanations and instructions
- Teach the student to write from left to right
- Provide the support of clear verbal instructions with demonstrations, or visual cues, for tasks requiring spatial organization
- Encourage the student to use verbal mediation to talk himself/herself through visual or spatial work
- When written output including copying is required, allow extra time for the student to proofread for accuracy
- Provide extra visual structure on worksheets and assignments
- Provide clear verbal instructions with a demonstration of the activity
- Use organizers like numbered boxes or colour codes
- Provide graph paper and lined paper for use when completing math exercises
- Limit use of visual strategies that are confusing, such as webs, diagrams, charts and schemas for math operations
- Reduce the amount of visual clutter
- Provide clear verbal instructions

Environmental Strategies

Phonological Processing

- Preferential seating away from sources of noise or distraction
- Arrange word walls in order of increasing complexity of sounds

Language

- Seating student away from sources of noise or distraction and/or close to teacher
- Provide and post on walls anchor charts, learning goals and success criteria

Visual-motor Skills

- Provide instructional materials in close proximity to the student to reduce visual-motor demand (e.g. copying from a distance)
- Prepare student work space (e.g. desk) with materials required for task completion to reduce visual-motor demands

Visual-spatial (perceptual) Skills

- Keep work space free of visual clutter that is not necessary to the task
- Simplify visual displays and include explicit information

Assessment Strategies

Phonological Processing

- Provide a variety of assessment methods including oral testing
- Provide access to resources such as spell check and/or a personalized word bank to prompt use of words and sentences when spelling is not the focus of the assessment

Language

- Ensure that the student understands directions
- Use a variety of assessment methods with low language demands (e.g. multiple choice, short answer, visual presentations, models, charts, etc.)
- Minimize the requirement for oral presentations

Visual-motor Skills

- Use a variety of assessment methods for tasks with high motor demands (e.g. written output, art, gym activities)
- Assessment methods to reduce written output may include oral, use of Assistive Technology, fill in the blank, multiple choice, short answer, diorama
- Do not time written output (e.g. math sheets) or penalize for slow completion

Visual-spatial (perceptual) Skills

- Use a variety of assessment methods: emphasize verbal and written answers, rather than charts, diagrams and maps
- Provide manipulative materials when assessing concepts involving spatial relationships
- Provide only a few questions and plenty of white space per page
- For written output including copying, allow extra time for student to proofread for accuracy

Possible Assistive Technology (Based on individual student needs, SEA guidelines apply)

Phonological Processing

Word Prediction:	Highlight words to hear how word is pronounced
Text to Speech:	Hear text read to students
Graphic Organizer:	Main ideas displayed in alternative format to text

Language

Word Prediction:	Support with predicting words as they express ideas in writing
Voice to Text	Express ideas using microphone and software types information
Text to Speech	Software reads assignments or test questions to support reading fluency

Visual-motor Skills

Speech to Text	Software converts spoken words into written text
Text to Speech/ Optical Character Recognition	Use Kurzweil to drag and drop information without needing to re-type
Graphic Organizer	Organize information

Visual-spatial (perceptual) Skills

Text to Speech	Software uses cues and prompts to draw attention to critical features (e.g. highlight key elements)
Graphic Organizer:	Review key concepts in alternative format

 Printed on recycled paper **Intended to be used in conjunction with the information in the LD module (https://bww.yrdsb.ca/services/student/Modules/LDModule/LD-Modules.aspx)** **SPE014A**

Understanding Learning Disabilities - How Processing Affects Learning

A chart designed to be used for starting points to think, plan and support programming in response to a student's assessed areas of strength and/or need

Definition

Memory

Memory: refers to the ability to retain information whether for the short-term or long-term.
Short-term memory– the storage of a small amount of information for a short period of time without rehearsal
Working memory– the ability to hold information in mind to work with it or apply it
Long-term memory– the storage of information for longer amounts of time
Retrieval– involves the use of strategies to quickly and efficiently access information; can be recall and/or recognition

Processing Speed

Processing Speed: refers to the ability to perform simple tasks quickly and efficiently. Delays in the ability to perform these small, simple tasks can interfere with the performance of more complex tasks.

Note: speed and efficiency are impacted, not the ability to perform the tasks.

Attention

Attention: refers to the ability to focus selectively on some activities while ignoring others, to sustain concentration for periods of time, to resist distraction, and to shift attention among tasks.

The LDAO recognizes attention as an important process that significantly impacts on learning; however, a deficit in attention is not diagnosable as a learning disability at this time.

Executive Function

Executive Function: refers to the ability to plan, organize and monitor learning, behaviour and emotions (e.g. like the conductor of the orchestra that coordinates the processes involved in learning). Executive function develops over time.

It is crucial to developing study strategies and becoming a better learner.

Possible Signs

Memory

Students may have difficulty:
- Remembering information they have just seen and heard
- Following directions, especially complex multi-step directions
- Listening to and understanding lengthy discussions
- Remembering information long enough to use it and understand it
- Remembering information over time, such as days and weeks
- Remembering information without memory cues
- Remembering sight word recognition and spelling
- Remembering ideas when writing
- Remembering number facts and steps involved in computations

What you may see: student may frequently ask for repeated instructions, or look lost after instructions have been given and not remember what he/she is supposed to do.

Processing Speed

Students may have difficulty:
- Completing tasks such as writing
- Recognizing simple visual patterns and scanning visual information quickly
- Taking timed tests that require simple decision-making
- Performing basic arithmetic calculations in a timed format
- Performing reasoning tasks under time pressure
- Reading for comprehension in an efficient manner
- Copying words or sentences correctly or formulating/writing passages

What you may see: student may take a long time to complete simple tasks even though he/she understands what is expected; may take a long time to answer questions and/or have difficulty getting his/her creative ideas down on paper in an efficient manner.

Attention

Students may have difficulty:
- With on-going attention to a task (e.g. appear distracted as if daydreaming)
- Maintaining consistent levels of attention (e.g. attention varies throughout the day, time and task)
- Paying attention for longer periods of time (e.g. may fatigue easily)
- Voluntarily controlling their attention in order to complete tasks
- Starting or finishing tasks
- Sitting still (e.g. may appear restless)
- Staying on-topic
- Organizing tasks and materials

What you may see: student may go off in tangents in conversation, jump from topic to topic, his/her desk is often messy and he/she often has difficulty finishing his/her work.

Executive Function

Students may have difficulty with:
- Starting and continuing work/effort to complete tasks
- Planning and setting goals to complete tasks
- Managing long-term assignments
- Managing and being aware of time
- Organizing belongings
- Awareness of own performance, (e.g. proofreading and editing written work)
- Managing and regulating emotions
- Being flexible as the circumstances demand (e.g. situations, aspects of problem solving, etc.)
- Controlling impulses or stopping their behaviour at appropriate times (e.g. thinking before he/she speaks or acts)
- Understanding the effect of their behaviour on others (e.g. self-monitoring)

What you may see: student may often be late to class, have difficulty using his/her agenda, forget to hand in assignments, hand them in late, forget items needed to complete his/her work, and desk is often messy.

Instructional Strategies

Memory

- Keep oral instructions short and simple
- Give a few instructions at a time and repeat as necessary
- Limit number of new facts, words and concepts presented in one lesson
- Teach the use of memory aids, such as verbal mediation or rehearsal or mnemonic strategies (e.g. HOMES for the Great Lakes)
- Encourage the student to apply information to enhance his/her memory and to make it meaningful for him/her
- Encourage and teach the student to use lists, advance organizers and personal planners as aids to memory
- Provide copied notes as needed
- Build repetition and review into each lesson, particularly for key concepts
- Allow the use of a calculator for math when computation skill is not the focus
- Allow more time to remember or provide recognition tasks (e.g. is it true that…?)
- Attach daily schedules/timetables to notebook covers
- Explicitly teach students ways to create study guides and take notes with scaffolded support to enhance recall and memory
- Break tasks into chunks/segments to ensure student remembers what to do for each segment of a large project
- Use visuals, mapping strategies and prompts to cue recall
- Communicate frequently with parents through communication book or email

Processing Speed

- Allow longer response time for the student to:
  - respond orally to questions in class
  - complete assignments in class
  - make decisions while being offered a choice of activities
- Review questions and expectations ahead of time to ensure the student understands what is required and may be encouraged to work more confidently and efficiently
- Reduce the quantity of work assigned, in favour of quality productions
- Provide copies of notes rather than requiring the student to copy information quickly
- Provide instruction to support reading fluency by:
  - teaching the ability to automatically recognize common letter sequences used in print
  - teaching sight vocabulary
- Provide instruction to support writing fluency
- Provide instruction to support math fluency
- Teach the student to monitor the time spent on each activity and allocate amounts of time for each task

Attention

- Chunk large assignments into smaller steps to ensure completion
- Have student repeat instructions to ensure understanding
- Give only one or two instructions at a time
- Supplement oral directions with written instructions (e.g. on a piece of paper the student can keep and re-read as needed) particularly if a sequence is involved
- Provide a structured program
- Post rules with clear expectations
- Provide direct instruction on organizational skills
- Vary presentation format
- Provide access to writing or speech to text software
- Use colour coding to highlight critical information
- Use novelty to help attract attention
- Modulate teaching voice to capture student's attention for key points
- Use a multi-media approach to learning
- Present lesson in different sense modalities (e.g. visual, auditory, tactile, interactive)
- Engage the student in helping to deliver the lesson
- Provide opportunity for rehearsal/repetition/practice
- Allow the student opportunities to change focus or tasks
- Use cueing strategies to help the student identify when they are off task
- Provide the student with appropriate opportunities to move around the room (e.g. passing out papers, delivering attendance forms to the office)
- Provide opportunity for physical exercise/movement breaks

Executive Function

- Provide direct instruction of executive functions and tools to support learning (e.g. student self-assessment, checklists, monitoring and planning sheets)
- Give time each day/week to organize materials and desk and provide direct support (e.g. review and complete checklist)
- Provide course outlines and organizers in advance
- Give outline/notes ahead of time of information to be covered in class
- Maintain a list of student contacts or have an on-line resource student can check for homework assistance
- Teach student how to develop timelines and to budget time
- Teach the student how to develop a work plan to get started and reinforce them for doing so
- Model and teach student how to break down assignments/projects into smaller steps
- Provide frequent descriptive feedback at critical points in the learning
- Foster planning and organization skills, monitor assignments closely, break down long-term assignments into smaller steps and check student's progress regularly
- Teach student to make "to-do" lists
- Teach the student to use self-regulation strategies (e.g. "stop and think")
- Use a "2-minute warning" or timer
- Use the student's strengths and interests to develop a daily plan
- Provide advanced preparations for changes in environment or routines
- Provide learning goals and success criteria

Environmental Strategies

Memory

- Provide visual cues (e.g. picture prompts)
- Display anchor charts (e.g. post key concepts) to cue memory

Processing Speed

- Preferential seating
- Reduce distractions in the environment

Attention

- Preferential seating away from sources of noise or distraction
- Reduce distracting stimuli (e.g. sit student at front of class) or increase stimuli (e.g. allowing use of squeezeball or iPod music) individualized by student need
- Provide more than one acceptable work area
- Provide optional use of a study carrel
- Keep student's space free of unnecessary materials

Executive Function

- Preferential locker location to help with organization and retrieval of items
- Preferential seating to optimize ability to monitor work
- Provide the option of a carrel around the desk
- Provide individual work space if requested or considered necessary
- Post visual cues/reminders, learning goals and success criteria
- Use picture prompts posted in the room or taped on the student's desk
- Use a countdown timer set to ring when the time for the task is up

Assessment Strategies

Memory

- Allow for additional time to complete assessments to ensure opportunity for recall
- Reduce the working memory demands on tests by providing a structure and outline for responding (e.g. fill in the blank, true or false)
- Check for understanding of the concepts, rather than for rote recall of facts and figures
- Provide opportunity for oral testing to allow prompts and decrease working memory demands
- Provide opportunity for more frequent, smaller assessments instead of large unit test

Processing Speed

- Use a variety of assessment methods with reduced written output demands (e.g. multiple choice, true/false, fill in the blank, Assistive Technology) to accommodate for slower reading, writing and math fluency
- Replace timed tests with alternative assessment procedures
- Emphasize accuracy rather than speed
- Do not time written output (e.g. math sheets) or penalize for slow completion

Attention

- Provide opportunities to demonstrate understanding in a variety of ways
- Make assessment expectations explicit (e.g. provide frequent review of learning goals and success criteria)
- Allow for the student to write down the main points and to expand on them verbally using key words
- Divide the test into parts and provide prompts for the purpose of drawing the student's attention back to the test (e.g. use timers if necessary)
- Provide periodic breaks
- Provide a quiet location, free from distractions

Executive Function

- Provide oral prompts for the student to begin work in tests and exams
- Permit the student to use a cueing system, visual or auditory, to monitor performance
- Provide checklists
- Break large projects into small tasks with clear timelines
- Divide the test into parts and give it to the student one section at a time or over a period of days
- Adapt the assessment (e.g. project, culminating activity, test, exam) to accommodate the student's executive function needs
- Structure opportunity for the student to plan, organize, sequence individual parts of the task, to facilitate successful overall completion

Possible Assistive Technology (Based on individual student needs, SEA guidelines apply)

Memory

Text to Speech/ Optical Character Recognition:	Drag and drop information from text to word document to create study notes Use Kurzweil virtual printer to convert activity sheet into readable document

Processing Speed

Word Prediction:	Support cognitive load, increase comprehension by removing need to decode information
Speech to Text	Record students answers for writing fluency
Text to Speech	Read assignments or test questions to support reading fluency

Attention

Speech to Text	Software coverts spoken word to written
Text to Speech/ Optical Character Recognition	Ability to drag and drop online information Organize main ideas and/or create study notes
Graphic Organizer:	Key information displayed in alternative format to help structure thinking and planning

Executive Function

Text to Speech/ Optical Character Recognition	Kurzweil highlight feature to summarize text, or concept Provide recorded prompts
Graphic Organizer	Smart Ideas to organize ideas

 Printed on recycled paper **Intended to be used in conjunction with the information in the LD module (https://bww.yrdsb.ca/services/student/Modules/LDModule/LD-Modules.aspx)** **SPE014A**