<div style="writing-mode: vertical">**Processing Speed**</div>

Definition: Ability to perform automatic thinking tasks while maintaining focused attention especially when pressured. Processing speed may also impact pace of retrieval of information and general rate of work completion.

Processing speed may be a hallmark of SLD when other cognitive processing abilities are within or above normative ranges and there appears to be compensation by other abilities, which could explain strengths and weaknesses in achievement. A flat profile in achievement with a flat profile in cognitive abilities would be indicative of a general learning disability.

Other factors to consider: Performance can be affected by motivation and attention, personality style, and cultural differences. Some gifted students show a relative weakness as they reflect and check answers before making a decision. Students who are very detail focused and methodical have the potential to be perceived as slow in processing.

Remediable: No

Related areas of processing: Short-term memory—language development and phonemic awareness

- Auditory Processing-Phonemic awareness— Phonetic decoding-

- Long-term retrieval—rapid naming

- Working memory— auditory decoding and comprehension

- Attention may be a factor when sustaining attention or applying knowledge

Processing Speed

Impacts: Efficient processing of information, quickly perceiving relationships, working within time parameters and completing simple rote tasks quickly. Processing visual information, completing tests and assignments within usual time constraints can also be difficult when the student has adequate skills and knowledge. May manifest as answering questions as if on a time delay or lag, difficulty in retrieving information from memory quickly, overload and loss of meaning if information presented too quickly. If the speed of the course or pacing in delivery of content exceeds the student's capacity to keep up, the student may appear inattentive, confused, frustrated, or overwhelmed.

More targeted areas of academic impact follow and should be useful in interpreting student work samples, observations, teacher interview, and test results.

Reading Achievement

- Slow reading speed--the ability to process symbols rapidly is important during all school years, especially elementary

- Impaired comprehension due to memory decay, and/or slow activation, which negatively impacts higher leveled thinking needed for comprehension. Need to reread for comprehension.

Math Achievement

- Automatic computations may be slow despite accuracy and over learning. Slow speed may reduce accuracy on multi-step procedures or problems.

- The ability to process symbols rapidly is important during all school years, especially elementary.

  - **Related areas of processing for math:**
    - Short-term memory—
    - Executive functions—planning
    - Working memory-visual and auditory
    - Attention

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Processing Speed

WRITING Achievement

- Limited output with time constraints.

- Labored process results in less complexity and depth in idea development and loss of motivation.

- The ability to process symbols rapidly is important during all school years for basic writing and related to all ages for written expression.

- <u>**Related areas of processing for writing:**</u>

  o Phonic coding- Early years (K-3)

  o Memory Span

  o Orthographic Processing- memory for units may play a role in spelling words

Additional Indicators across other environments and contexts

- **At home, with peers, in the community**

- **Observed behaviors during assessment**

- **Other indicators in performance or vocational readiness**

Recommendation for Differentiation in the General Classroom for Processing Speed: (includes changes in methods, Universal Design for Learning, process, accommodations, assistive technology, etc.)

Research-based Implications for Instruction, Curriculum, Environment (ICE):

Instruction:

1. Be aware of pacing of instruction and content delivery. Provide more wait time provide most critical information first with reinforcement and practice to assure time
2. Research based accommodations: provide extended time, shortened directions and assignments (Ofiesh, 2000)
3. Provide instructional interventions designed to increase reading rate and fluency.
4. Repeated reading, choral reading, meta-cognitive instruction (see Hale and Fiorello 2004 for more).
5. Use a variety of techniques to make content concepts clear (i.e.: be succinct, modeling, preview material, hands on activities, etc)
6. Corrective reading or automaticity instruction
7. Culturally and Linguistically Diverse Students may show difficulty with processing speed that may or may not be related to disability. Strategies for instruction include:
   - Speech appropriate for student's proficiency levels
   - Clear explanation of Academic tasks (i.e.: step by step, graphic organizers, oral input supported by written, modeled input, etc.) .

Curriculum:

Evaluate curriculum and pacing for a goodness of fit. Prioritize delivery of content

Environment:

Content	Process	Product
Prioritize content and introduce most critical material first.

Provide time to process and ask questions.

Allow multiple different ways to process information so that the student who needs more time has quiet time to process.

Repeat instructions and employ nonverbal directions. Present information in auditory and visual ways.

Build sight word vocabulary and over learn math facts to improve efficiency.

Use clearly established and understood daily routines to help the student sequence expectations, and reduce anxiety.

Reduce environmental distractions and utilize small grouping. | Use choral, repeated, or paired reading.

Teach students to skim or scan for key information by reading titles and headings, reading chapter questions, and paying attention to bold type. Teach strategic highlighting and/or use of sticky notes to access key information.

Provide activities to increase rate and fluency (flash cards, speed drills, educational software).

Increase "wait" time before and after questions are asked and responses are given. .

Teach listening strategies for use audio and visual electronic versions of text (e.g. Novels, text books), combined with following along using a highlighter to more correctly pace reading and increase comprehension, and eliminate anxiety. | Allow extended time to do tasks, take tests, or ask/answer questions.

Reduce quantity of work in favor of quality of work.

Limit or structure copying activities.

Allow "hands on" products to demonstrate mastery level of concepts (CLD students or applicable for all students?)

Allow student to use note-taking aids in class (i.e. recording pen, recorded lectures) for later review at his/her own pace or utilize peer note-taking on carbonless paper.

Introduce the student to voice recognition that will record words into text to facilitate the completion of writing assignments.

Permit the use of scribe or recorded responses for testing purposes. |

Implications for Achieving Proficiency on State Standards

Samples of English Language Arts content standards, if unsupported, may exceed a student's reasoning capacities or compensatory strategies, which in turn will decrease the likelihood of reaching proficiency and transferring learning to new situations:

Resources and Research Implicating Link to Achievement

Woodcock Johnson III : Reports, Recommendations, and Strategies by Nancy Mather and Lynne E. Jaffe

Essentials of Evidence-Based Academic Interventions by Barbara J. Wendling and Nancy Mather

Cognitive Functioning: Identifying, Understanding, and Addressing the Impact of Cognitive Deficits in the Classroom (PowerPoint) by Jennifer Mascolo PsyD St. Johns University

Assortment of CHC Theory documents by Flanagen, Ortiz,, Alfonso, Mascolo, and McGrew