

Definition: There are two abilities involved. The effortful retrieval of previously learned associations or stored memories (activated by working memory) and rapid automatic retrieval of names, concepts or associations (activated by short-term memory). Rapid automatic naming is represents that ability to quickly and automatically name colors and letter names. Rapid-automatic naming is a highly correlated with acquisition and proficiency of basic reading skills.

Remediable: No known research-based or supported examples.

Impacts: Ability to retrieve, automatically or consciously recently learned (older than 20 minutes) concepts. When automatic unconscious retrieval fails, such as letter sound associations or math facts, working memory must allocate space for a conscious search. Some information will be over learned and will require unconscious or effort less retrieval from long-term memory, while other information requires effort to retrieve from long-term memory. Student performance data may appear to indicate inconsistency; however, what is being manifested is a different action required. Slow speed in long-term , effortful, retrieval affects the pace of learning as well as work completion. In some significant cases slow retrieval speed can be observed. The student may appear to put significant effort into recalling facts, letter sounds, and concepts or content that appears to have been previously mastered. In some cases retrieval is inconsistent, and what the student appears to know today may not be easily retrieved tomorrow. There may be difficulty in recalling specific facts, details, words, or faulty associations. More targeted areas of academic impact follow and should be useful in interpreting student work samples, teacher interview, and test results.

READING Achievement

- Difficulty accessing prior knowledge to support new learning (support vocabulary or concepts) or phonological associations (support phonemic awareness).
- Slow access of phonological associations and decoding (rapid automatic naming)
- Making connections through oral or writing.

MATH Achievement

- Recalling basic facts,
- Recalling procedures to be used, conditional procedures, or sequences.

WRITING Achievement

- Accessing words during writing process.
- Making written arguments such as comparing and contrasting, persuasion, summarizing, etc.
- Use of speech fillers , interruptions in thoughts when making oral or written arguments.

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**

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

Instruction:

- Provide multiple points of association or elaboration of new learning. The greater the number of associations a student has with a word, concept, skill, etc. the easier it will be to retrieve from long-term memory.
- Pre-teach critical vocabulary and concepts following research-based procedures, use of anticipatory sets, linking activation of prior knowledge with text prediction, Directed Reading Activity, semantic mapping,
- Follow a scaffolded instruction model such as that used in the Strategic Instruction or Direct Instruction Model to ensure consistent practice and review with specific feedback.
- Teach meta-cognitive strategies and pair with phonics instruction, comprehension strategy instruction, etc.

Curriculum:

- Critically analyze content to be delivered, prioritize and pace instruction, such that the most critical content is delivered with multiple opportunities to practice and review.
- Select materials that provide extended practice, multi-sensory techniques, encourages activities that explicitly activate associations.

Environment:

Recommendation for Differentiation in the General Classroom for Long-term Retrieval: (includes changes in methods, Universal Design for Learning, process, compensatory strategies, accommodations, assistive technology, etc.)

Content	Process	Product
<p>Use research-based strategies for organizing and teaching such as those produced by University of Kansas e.g. Content Enhancement Routines: (teaching routines for planning & leading learning; routines for exploring text, topics, details; routines for teaching concepts).</p> <p>Use research-based methods for introducing vocabulary to facilitate recall.</p> <p>Teach explicit connections between old and new learning.</p> <p>Use higher level questioning techniques to prompt student to make personal associations and deeper connections between new and known.</p> <p>Limit amount of material or pacing of content delivery to allow for over learning, review, and repetition to</p>	<p>Use research-based strategies for teaching a process such as those by Graham and Harris (POWER and TREE writing strategies) University of Kansas Strategic Instruction Model Strategies and Content Enhancement Routines (LINCS, Paraphrasing, Inferencing, teaching routines to improve performance).</p> <p>Use of elaboration strategy and multiple modalities to increase the number of associations and connections.</p> <p>Explicitly activate prior knowledge, use anticipation guides, create schema, etc. to facilitate associations with new information.</p> <p>Scaffold calculation instruction prior to teaching math facts (ie: $x+0$, $x+1$, $x+2$, etc).</p> <p>Build in wait time and various</p>	<p>Modified test format (matching, multiple choice, *Not: fill in the blank)</p> <p>Use word banks, procedure journals or cue cards to facilitate recall. Use of topic dictionaries in word prediction programs can assist in using academic vocabulary when writing.</p> <p>Reduce time constraints, allow breaks, and provide training to reduce anxiety (when present) and fatigue during testing or time sensitive assignments.</p> <p>Consciously select means of assessment and match with expectations. Be clear on what information needs to be recognized vs. recalled. Vs. constructed.</p> <p>Consider allowing students to use note cards when the focus of assessment is on manipulation or construction of new knowledge to reduce demands on retrieval.</p>

<p>build multiple representations in long-term memory and facilitate recall.</p> <p>Facilitate recall of content and procedures with mnemonics and acronyms, and specific elaborations or connections that are personally meaningful.</p>	<p>opportunities for students to access and show what they know.</p> <p>Provide multisensory learning, use visual, kinesthetic, vocal, and auditory channels as appropriate to elaborate associations.</p> <p>Provide a list of steps that will help organize behavior and facilitate recall such as chunking, notes in margins, etc.</p> <p>Provide immediate feedback</p> <p>Limit the number of new facts, words, concepts presented in one session</p>	
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Implications for Achieving Proficiency on State Standards

- Grade 3 Language Standards Knowledge of Language: choose words and phrases for effect.
- Grade 4 Speaking Viewing, Listening, and Media Literacy Standards Comprehension and Collaboration: paraphrase portions of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.
- Grade 3 Reading Standards for Literature Craft and Structure: Determine the meaning of words and phrases as they are use din a text, distinguishing, literal from non-literal language, including figurative language such as similes, (adds allusions to significant characters found in mythology in grade 4, and figurative language including metaphors and similes in grade 5)
- Grade 6-8 Standards for Reading Science and Technical Content: Determine the critical ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinion.

- Grade 9-10 Reading Standards for Literature Craft and Structure: Analyze how an author's choices concerning how to structure a text, order, events within it (e.g., parallel plots), and manipulate time, to create such effects as mystery, tension, or surprise.

Resources

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 Flanagan, Ortiz,, Alfonso, Mascolo, and McGrew

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