**Crystallized Intelligence (Gc)**
The breadth and depth of knowledge and skills that are valued by one's culture.

**Listening Ability (LS)**
The ability to understand speech.

**Grammatical Sensitivity (MY)**
Awareness of the formal rules of grammar and morphology of words in speech.

**Lexical Knowledge (VL)**
Extent of vocabulary that can be understood in terms of correct word meanings.

**General Verbal Information (KO)**
The breadth and depth of general stored knowledge.

**Language Development (LD)**
General understanding of spoken language at the level of words, idioms, and sentences.

**Communication Ability (CM)**
The ability to use speech to communicate thoughts clearly.

**Link to Achievement**

**Reading:** Crystallized abilities, especially one’s language development, vocabulary knowledge, and the ability to listen are important for reading. This ability is related to reading comprehension in particular. Low crystallized abilities may hamper an individual’s ability to comprehend written text due to a lack of vocabulary knowledge, basic concepts, and general life experiences that are needed to understand the text.

**Math:** Crystallized abilities, including language development, vocabulary knowledge, and listening abilities are important to math achievement at all ages. These abilities become increasingly more important with age. Low crystallized abilities may hamper an individual’s ability to comprehend word problems due to a lack of vocabulary knowledge. They may hamper one’s ability to learn basic math processes, such as long division, due to impairments in one’s ability to listen to and follow sequential directions.

**Written Expression:** Crystallized abilities, such as language development, vocabulary knowledge, and general information are important to writing achievement primarily after age seven (7). These abilities become increasingly more important with age.

**Oral Language:** Crystallized abilities, especially one’s language development, vocabulary knowledge, and the ability to listen are important for both listening comprehension and oral expression. Low crystallized abilities may hamper an individual’s ability to comprehend oral communications due to a lack of vocabulary knowledge, basic concepts, and general life experiences that are needed to understand the information being presented.
**Link to Achievement**

**Reading:** Fluid reasoning or reasoning abilities have been shown to play a moderate role in reading. For example, the ability to reach general conclusions from specific information is important for reading comprehension.

**Math:** Fluid reasoning is related to mathematical activities at all ages. For example, figuring out how to set up math problems by using information in a word problem is important for math reasoning. This is especially true for students ages 6-13.

**Written Expression:** Fluid Reasoning skills are related to basic writing skills primarily in the elementary school years and are consistently related to written expression at all ages.
Link to Achievement

Reading: Auditory processing or “phonological awareness/processing” is very important to reading achievement or reading development. Students who have difficulty with processing auditory stimuli may experience problems with learning grapheme-to-phoneme correspondence, reading non-sense words, and decoding words due to an inability to segment, analyze, and synthesize speech sounds. Older students will usually have continued problems with decoding unfamiliar words.

Written Expression: Auditory processing is also very important for both writing skills and written expression. Students who are weak in auditory processing abilities may have difficulty spelling since this skill requires the ability to attend to the detailed sequence of sounds in words.

Oral Language: Auditory processing deficits may be linked to academic difficulties with listening comprehension. Students may have difficulty interpreting lectures, understanding oral directions, and learning a foreign language.
**Link to Achievement**

**Reading:** Long-term retrieval abilities are particularly important for reading. For example, elementary school children who have difficulty naming objects or categories of objects rapidly may have difficulty in reading. Associative memory abilities also play a role in reading achievement (i.e., being able to associate a letter shape to its name and its sound).

**Math:** Long-term retrieval abilities are important to math calculation skills. For example, students with deficits in long-term retrieval may have difficulty recalling basic addition, subtraction, multiplication, and/or division facts when encountered within a math problem.

**Written Expression:** Long-term retrieval abilities and naming facility in particular have demonstrated relations with written expression, primarily with the fluency aspect of writing.
Link to Achievement

**Reading:** Short-term memory is important to reading achievement. Reading comprehension, involving long reading passages, may be affected by skills specifically related to working memory. Basic word reading may be impacted by deficits in short-term memory because it may interfere with acquiring letter and word identification skills.

**Math:** Short-term memory is important to math computation skills. For example, deficits in short-term memory may impact one’s ability to remember a sequence of orally presented steps required to solve long math problems (i.e., first multiply, then add, then subtract).

**Written Expression:** Short-term memory is important to writing. Memory span is especially important to spelling skills, where working memory has shown relations with advanced writing skills (e.g., written expression).

**Oral Language:** A student with short-term memory deficits may have problems following oral directions because they are unable to retain the information long enough to be acted upon. A student with short-term memory deficits also may have problems with oral expression because of difficulties with word-find or being unable to retain information long enough to verbally express it.

The following information was adapted from:
**Reading:** Perceptual speed is important during all school years, particularly the elementary school years. Slow processing speed may impact upon reasoning skills since the basic rapid process of symbols (e.g., letters) is often necessary for fluent reading.

**Math:** Processing speed is important to math achievement during all school years, particularly the elementary school years. Slow processing speed leads to a lack of automaticity in basic math operations (e.g., addition, subtraction, and multiplication).

**Written Expression:** Perceptual speed is important during all school years for basic writing and related to all ages for written expression.

The following information was adapted from:


**Link to Achievement**

**Math:** Visual Processing may be important for tasks that require abstract reasoning or mathematical skills.