Memory impacts a person’s ability to perform almost any activity.

Memory is how “knowledge is encoded, stored, and later retrieved.”

Even mild memory deficits can impact a student’s success.

(Kandel, Schwartz, and Jessell, 2000)

Types of Memory

- Long-term memory
- Short-term memory
- Working memory
- Auditory memory
- Visual memory

HearBuilder® Auditory Memory targets auditory memory and working memory by teaching students to use research-based strategies.
Auditory Memory

- The ability to take in information that is presented orally, process it, retain it in one's mind, and then recall it.
- Auditory memory requires working memory.

(Bellis, 2003; Roess & Douste, 2004; Strother-Brown & Johnson, 2004)

Working Memory

- “The management, manipulation, and transformation of information drawn from short-term memory and long-term memory”

(Dehn, 2008)

Models of Memory – 1960s

- Information Processing Model – memory is a key component of cognitive functioning. When new information is introduced, the likeliness of learning is directly related to the depth of processing.
- Atkinson-Shiffrin Model – memory consists of Sensory Memory (immediate memory), Short-term Memory, and Long-term Memory. Assumed to be linear.
A Model of Working Memory

- Baddeley and Hitch (1974) proposed the idea of a “working memory.”
- Working memory was a component of short-term memory.
- Three components to working memory
  - Central executive
  - Phonological loop
  - Visuo-spatial sketchpad

Working Memory Components

- **Central Executive** coordinates and shifts attention between the two systems.
- **Phonological Loop** is temporary storage that translates information into a phonological state and holds that information for a few seconds.
- **Visuo-spatial Sketchpad** is temporary storage of visual information.

(Dohi, 2008)

Working Memory Capacity

- Working memory is responsible for processing higher level linguistic information.
- Capacity of memory is affected by the complexity of the task.
- If the task is more complex, working memory spends more time processing.
- This will affect short-term memory capabilities.

(Daneman and Carpenter, 1980)
Development of Auditory Memory

- Infants use auditory memory to imitate speech.
- Age 4;0 can recall three digits, by age 12;0, six digits.
- Between 4;0-14;0 working memory and short-term memory increase by two to three times.
- As children become older use of memory strategies become more frequent, consistent, and complex.

Development of Working Memory

- Working memory increases in capacity and span, becoming more accurate, processing more quickly, and handling more information at a time.
- Short-term memory span is partially dependent on the efficiency of working memory.

Working Memory and Learning

- Memory is highly correlated with intelligence and achievement.
- Working memory capacity has significant relationships with
  - reading decoding
  - language comprehension
  - spelling
  - following directions
  - vocabulary development
  - note taking
  - GPA

(Engle, Tuholski, Laughlin, and Conway, 1999)
Auditory Memory Deficits

- Remembering multi-step directions
- Relating new information to prior knowledge
- Oral language comprehension
- Taking notes while listening
- Verbal fluid reasoning
- Written expression
- Oral expression

(Dehn, 2008)

Strategic Interventions

- Most people naturally develop and use strategies to improve their memory performance.
- Those with deficits and weakness need direct teaching which can improve working memory performance.

(Torgesen & Goldman, 1977)

Effective Strategy Teaching

- One-on-one brief, focused sessions over several weeks
- Teach one strategy at a time.
- Explain purpose and rationale.
- Explain and model the steps of the strategy.
- Provide plenty of practice and offer feedback.
- Teach cues to help remember the strategy.
- Provide positive reinforcement and data tracking.
- Encourage children to monitor and evaluate strategy use.
- Encourage generalization across sessions.

(Dehn, 2008)
Types of Strategies

- Verbal Rehearsal
- Elaborative Rehearsal
- Chunking
- Relational Strategies

Memory Strategies for Numbers

- Try saying the numbers over and over, like this: 2, 7, 5; 2, 7, 5; 2, 7, 5.
- Think of the numbers in groups. So if you hear 5, 3, 7, 2, 4, 6—think 5 3 7, 2 4 6.
- Try putting the numbers together. So if you hear 2, 4, 8, 3—think 24, 83.
- Try putting the numbers to a rhythm or song, like: 5-8-6, 7-4-1.
- Try picturing the numbers in your head as you hear them.

Memory Strategies for Words

- Try saying the words over and over, like this: key, pig, hat; key, pig, hat; key pig, hat.
- Try putting the words to a rhythm or song, like this: star-book-shoe-key.
- Try to picture the words in your head as you hear them, like: moon, rug, book.
- Try to make a simple sentence using the words you hear. If you hear dog, hat, bed, make a silly sentence like, The dog found a hat under the bed.
Memory Strategies for Details

- Try saying the words over and over, like: blonde hair, hat, phone; blonde hair, hat, phone; blonde hair, hat, phone.

- Try to picture the details in your head as you hear them, like: brown hair, blue shirt, long pants, walking a dog.

- Try putting the words to a rhythm or song, like: black hair-long pants-walking dog, black hair-long pants-walking dog.

Memory Strategies for Auditory Closure

- Listen for key words in the sentence and try to think of a word that goes with it. If you hear shoes, think of what would go with shoes—socks.

- Try to repeat the sentence in your head and think of each answer option in the place of the jumbled word. Then pick which one makes the most sense.

Memory Strategies for WH Info

- Try to picture the details in your head as you hear them, like: Go to the library on 4th Street, bring 3 chocolate donuts and a watch.

- Try repeating the details over and over to yourself, like: 4th Street, 3 chocolate donuts, watch; 4th Street, 3 chocolate donuts, watch.

- Try to remember who the story is about, what they are doing, where they are, and when they are doing it.
HearBuilder® Auditory Memory

- Memory for Numbers
- Memory for Words
- Memory for Details
- Auditory Closure
- Memory for WH Info

Software Demonstration

- Memory for Numbers
- Memory for Words
- Memory for Details
- Auditory Closure
- Memory for WH Info

HearBuilder® Auditory Memory

- Measurable learning objectives for every level
- Customizable
- Set, change, monitor levels of difficulty
- Add background noise
- Data-tracking for unlimited number of students
- Customizable and printable reports