"What If They Aren't Ignoring You?"

How Poor Working Memory Affects Students and How Educators Can Mitigate This Impact in the Classroom

Delaney Rosenberg, EdD Candidate

New England College

For comments or questions for the author, contact Delaney Rosenberg at

drosenberg_gps@nec.edu

Abstract

For educators today, it can be challenging to support students with weak working memories, as working memory difficulties are often associated with increased distractibility, inattention, and struggles with executive function tasks. This article delves into the current literature on working memory, how a weak working memory can impact students' learning experiences, and researchers' suggestions for ways to support students with working memory difficulties. Additionally, this article makes clear connections between the brain research on working memory, the reality of what is feasible to implement in a classroom environment, and my experiences as an educator; the recommended strategies and next steps included in this text are meant to be practical, easy-to-implement, and supportive scaffolds for "all" students, not just those who struggle with working memory.

Keywords: executive function, working memory, working memory duration, working memory span, dyslexia, ADHD

Imagine you are a first-grade student sitting down for a lesson on the carpet. Your teacher has instructed you to bring a clipboard, a worksheet, and a pencil. You grab the worksheet on your work table, find a clipboard across the room, and sit down only to notice you forgot your

pencil. You get up, go back to your work table, grab your pencil, and sit back down on the carpet to realize that you have already missed the next set of directions while you were locating your materials. You look around at your peers in the hopes of a visual aid or clue that you can use to find your way, but feel absolutely lost. You settle for doodling on your worksheet until you can find another way to access the lesson.

Unfortunately, this scenario is a reality for at least 10% of students (International Dyslexia Association, 2020). Students who demonstrate inattentive behavior, which can appear to many educators as a learner "spacing out," "refusing to do work," or "being off task" could actually be the effects of a weak working memory (Holmes et al., 2010). For example, Kofler et al. (2018) found that 38%–57% of working memory's effects on executive functioning was "conveyed by working memory's association with inattentive behavior" (p. 57). Thus, this article is a call to action for my fellow educators and my way of working toward what Gathercole et al. (2008, as cited in Holmes et al., 2010) believe is the first step to supporting students who experience challenges with focusing and sustaining attention, especially those with poor working memory: educating educators. As someone who has dedicated her life to supporting and advocating for the students who have been deemed "distracted," "unmotivated," or "lazy," due to struggles with attention, I seek to provide a robust review of the current literature on working memory, how a weak working memory affects students, and ways that educators can support students with weak working memory in the classroom. I then discuss my own experiences as a professional who educates students with poor working memory before making final recommendations for the reader. Despite the fact that this article focuses on supporting learners with weak working memory, I must emphasize that these strategies are helpful and necessary for

all of the children in our care. As a result, I recommend and encourage the reader to give these strategies a try with all of your students.

Review of the Literature

What Is Working Memory?

The concept of working memory and its role in the learning process has been researched, explored, and theorized for decades, but how to intervene when a child struggles with working memory is still a topic of conversation (Gathercole & Alloway, 2007; Holmes et al., 2010; Santacruz & Ortega, 2018; Sousa, 2022; Sousa, 2024; Woodin, 2022). Researchers have described working memory in a number of ways, and all of these ways speak to its multifaceted, complex, and sometimes perplexing, nature. For example, Sousa (2022) described how the Information Processing Model "represents working memory as a work table, a place of limited capacity where we can build, take apart, or rework ideas for eventual storage somewhere else" (p. 43). This model was originally developed by Robert Stahl (as cited in Stahl & Murphy, 1981), who called it the Stahl perceptual information processing and operation model. The model showcased the locations in the brain that information can go through, including through working memory, in an effort to store it in long-term memory. Specifically, Stahl and Murphy (1981) indicated that information must be attended to by the sensory or perceptual register before being transferred to short-term memory, which differs from working memory in that it retains basic features of recently received information for a short amount of time (p. 15). From there, in this model, the executor, or the director of the information, determines if and how the information will be transferred to working memory by assigning meaning to it. When the information arrives to the working memory, Stahl and Murphy (1981) described this location, or Sousa's aforementioned "work table," as the "arena where newly received information actively interacts

with information obtained via Long Term Memory" (p. 18). Thus, in Stahl's model, working memory was considered to be the setting for an information dance, or exchange, between working memory and long-term memory. This exchange determines whether the information is stored in Long Term Memory, depending on how many connections can be made between the new information and the old, stored memories.

In comparison, Baddeley and Hitch's (1974) incredibly famous multicomponent theory of memory showcased how working memory itself has many systems rather than focusing on the information processing system as a whole. Baddeley and Hitch's (1974) working memory model included: the phonological (which deals with speech-based information), the visuospatial (which deals with visual and spatial information), the central executive (which deals with when and where information is delivered, task switching, focusing, and dividing attention), and their later addition, the episodic buffer (which integrates information from the various multiple parts into episodes); these components all contribute to "the possibility to combine information from different sources (verbal and visual) into episodes, manipulate information, modify it, and ultimately link it to the knowledge stored in the individual's long-term memory" (Santacruz & Ortega, 2018, p. 32), their version of Stahl's dance. Baddeley and Hitch (1974), explained that this transfer of information from working memory to long-term storage is "the most specific function which has so far been identified with working memory" (p. 86). Thus, it is evident that working memory is complex but that its main purpose—as is reiterated in these two models, albeit in different ways—is to process sensory, or immediate, information to potentially store, and later retrieve, it from long-term memory (Sousa, 2022).

Therefore, without having some link to long-term storage, it is clear that the working memory system cannot hold on to information for a very long duration. Additionally, the amount

of information that it can temporarily store, called the working memory span, varies from person to person (Sousa, 2022, 2024); working memory span even varies based on whether the information being held is verbal or visual-spatial (Working Memory for Educational Psychologists, 2015, March 29b), and based on the cognitive strategies that individuals use when acquiring the information (Pearson & Keogh, 2019). To compound this unfortunate truth about working memory span, new research has demonstrated that working memory's capacity could actually be lower than previously conjectured spans (Sousa, 2024), like the "magical number seven" items (Working Memory for Educational Psychologists, 2015, March 29b) or the averages of five items for 5- to 13-year-olds and seven items for individuals fourteen and older (Sousa, 2024). It is unclear why working memory spans are seemingly decreasing; however, Sousa (2024) speculates that working memory spans could be smaller due to people becoming more distractible or students learning more about where to find information rather than learning the information itself, thanks to the immediacy of technology. For example, students may remember that information about Ancient Greece can be located by navigating to a certain website rather than by memorizing or noting the information itself.

Working Memory's Role During the Learning Process

Despite its limitations in storage capacity and duration, working memory is a central component of the learning process and is a key factor in whether students are able to perform a task and how many they can accomplish. For example, working memory processes include holding onto, or attending to, a question long enough to formulate an answer, remembering multi-step directions, and performing mental math computations, among many others (International Dyslexia Association, 2020). As previously explained, working memory also captures verbal and visual information and serves as the "go-between" for short and long-term

memory (International Dyslexia Association, 2020, para. 10). On top of these purposes, working memory aids with focusing, ignoring distractions, and switching between tasks (International Dyslexia Association, 2020). Thus, it is an essential piece of the memory storage process.

What Happens When Students Have Weak Working Memory?

One of the most difficult aspects of supporting students with weak working memory is identifying whether weak working memory is actually the culprit. After all, as Working Memory for Educational Psychologists (2015, March 29a) explained, students with working memory challenges may find remembering information difficult because of a small capacity for recalling it, may take more time to process information, and may be more easily distracted. These effects look similar to effects of other types of learning difficulties, like ADHD or a specific learning disability.

It has been proven that genes, rather than the child's background, play a seminal role in working memory (Gathercole & Alloway, 2007) and that working memory is especially difficult for students with ADHD, Inattentive Type (International Dyslexia Association, 2020). Working memory challenges are also associated with a broad range of genetic and neurodevelopmental disorders, such as dyslexia and ADHD; this creates confusion about whether academic and behavioral difficulties are due to these disorders or working memory issues (Holmes et al., 2010). Today, as working memory span and attention duration decrease among students, it will perhaps become more prevalent that we treat all students as learners with weak working memory, meaning that we cannot differentiate between learners with a learning disability and those without.

Despite it being difficult to ascertain what the originating cause of these difficulties is, it is clear to a number of researchers that the effects of poor working memory are vast, so educators

should be on the lookout for a multitude of impacts on both learning and behavior (Holmes et al., 2010; Working Memory for Educational Psychologists, 2015, March 29a). Specifically, educators should be aware of challenges in the following areas:

- Reading, specifically phonological processing. Sousa (2022) attested students with working memory challenges have difficulty retaining phonemes, or segments of sound, and therefore are unable to remember words long enough to understand a sentence. This extends to readers with strong decoding skills too, who may not be able to remember what they read due to weak working memory (International Dyslexia Association, 2020).
- Math, specifically storing and retrieving numbers and number facts (International Dyslexia Association, 2020). Math involves a large amount of retrieval and recall, as well as multi-step directions. As Gathercole and Alloway (2007) explained, activities like this "require the child to hold in mind some information . . . while doing something that for them is mentally challenging . . . These are the kinds of activities on which children with poor working memory struggle with most" (p. 9).
- Learning another language. Similarly, learning another language involves holding onto information while applying that information to another context, especially when acquiring new vocabulary (Santacruz & Ortega, 2018).
- Overall academic achievement. This is another "chicken or the egg" scenario, as poor working memory is three times higher in students with low academic achievement (Holmes et al., 2010). At the same time, learners with poor working memory struggle with tasks related to academic achievement and will therefore, often make poor academic progress (Gathercole & Alloway, 2007).

- Executive function skills and habits of learning. Not only do problems with working memory make it difficult for students to hold onto information long enough to perform a series of tasks, such as following directions, listening, taking notes, and focusing, but because students with weak working memory have limited working memory spans, it is easier for their working memory to allow irrelevant information or stimuli to interfere with their thinking (Holmes et al., 2010). Therefore, they may space out or find something else to do with their bodies (Working Memory for Educational Psychologists, 2015, March 29b).

What Experts Recommend for Supporting Students With Weak Working Memory

Fortunately, there are a number of different strategies that experts in the field recommend for supporting individuals with weak working memory that can be easily translated to the classroom environment. Of these strategies, researchers like Holmes et al. (2010) agree that there are three overarching intervention categories: (a) educators reducing memory loads in the classroom; (b) educators teaching children memory strategies (like rehearsal, chunking, story generation, and visual imagery); (c) and training children's working memory through repeated practice.

Although there is positive evidence for all three intervention types, especially training children's working memory through training programs (Holmes et al., 2010), in my opinion, educators reducing students' memory loads seems to be the most feasible to implement in the classroom environment. One reason for this is that working memory training involves repeated, intensive, and adaptive training tasks, which could be extremely time-consuming for teachers to research, develop, and administer. Conversely, strategies for reducing students' memory loads are ones that could be more easily created and implemented in the classroom because, in many

cases, they are similar or identical to accommodations or scaffolds that may appear in students' documents like individual education plans (IEPs) or 504 plans (accommodations to ensure equal access, without altering the curriculum). It could be argued that teaching children memory strategies is also doable, but this approach has not yielded strong transfer effects in improving academic achievement (Holmes et al., 2010).

Therefore, to reduce memory loads in the classroom, Gathercole et al. (2008) developed the seven stages, (as cited in Holmes et al., 2010):

1. Educate teachers in working memory and how to identify students with working memory challenges.
2. Monitor how children "cope with mentally challenging activities" (p. 20).
3. Evaluate activities to determine which ones will be difficult for children with working memory challenges.
4. Adjust/revise activities to reduce working memory loads.
5. Frequently repeat information, like directions.
6. Provide and promote memory aids.
7. Encourage children to find their own strategies (pp. 20–21).

These seven stages are, understandably, quite broad and can lead educators in a number of different directions. As a result, this literature review also contains more specific strategies that researchers recommend, which seem to relate to steps four and six of Gathercole et al.'s (2008) aforementioned stages. The following are some of these more specific strategies:

- Get students' attention with meaning. For better or for worse, emotions decide what information gets processed in our working memory (Sousa, 2024). This is because sense and meaning are needed to retain learning, and of the two, meaning has a

greater likelihood of retention (Sousa, 2022); therefore, if an educator makes the information meaningful by appealing to learners' interests or emotions, modeling, or creating fun mnemonic devices (Sousa, 2022), there is greater likelihood that learners will hold onto the learning. This is an especially important approach for students who have a negative self-concept, as "the self-concept controls the feedback loop and determines how the individual will respond to almost any new learning situation" (Sousa, 2022, p. 51).

- Incorporate music and creativity. As many musicians know, a number of processes are involved in making music and communication occurs between brain regions that do not typically interact during "noncreative thinking" (Sousa, 2024, p. 94). Therefore, when an educator incorporates creative elements in students' learning experiences, more areas of the brain are involved in acquiring and storing the information; this increases the likelihood that the learning will be stored and recalled later on, which all translates to what Sousa (2022) deemed "less mental effort" (p. 221).
- Take advantage of prime-times. The primacy-recency effect dictates that new information should always be presented in prime-time-1 and closure should be made in prime-time-2. This is because, in a class period, students remember the first and last sections the most (Sousa, 2022). When using a 40-minute instructional period as an example, Sousa (2022) explains that prime-time-1 is about 20 minutes while prime-time-2 is about 10 minutes; anything in between is the down-time.
- Involve multiple modalities and types of activities. Whenever possible, combine verbal, visual, and physical information so that information is stored in a variety of

places in a number of ways. Sousa (2022) suggested using strategies like visualized note-taking or incorporating movement.

- Chunk, chunk, and chunk some more. Chunking involves breaking a task into manageable pieces, which is especially helpful for students who have difficulty holding on to a lot of information at once. Spencer (2025) recommended a chunking approach for project-based learning in particular, which consists of providing students with a blueprint/chunking the project, giving them tools with which to visualize the corresponding deadlines, and assisting students with creating to-do lists that contain smaller steps to reach each deadline/chunk. He recommended progress bars or maps for this, which also caters to students' need for multisensory approaches.
- Model what you, the educator, would like to see. Demonstrating processes for students is a multisensory approach because it involves verbal stimuli and visual stimuli; modeling provides opportunities for worked examples and repetition too, which are two approaches that the International Dyslexia Association (2020) recommended for students with working memory challenges.

Conclusions

Working memory is a key component of the memory storing and retrieval processes in the brain (Sousa, 2022). I believe that, regardless of whether students have weak working memory as a consequence of other diagnoses or whether their diagnoses are a consequence of poor working memory, it is necessary for educators to support students with working memory challenges in whatever ways possible. This is because, when students have weak working memory, it can result in challenges both academically and behaviorally, which lead to low academic achievement (Gathercole & Alloway, 2007). Researchers have recommended countless

strategies. As an educator, I believe that the most feasible ones are those that aid in reducing students' working memory loads so that they are better able to acquire, retain, and recall essential information. After all, as classroom educators, we do not readily have access to working memory training programs like researchers do, and though teaching students working memory strategies that they can use later on may seem like a beneficial intervention, its transfer effects on academic achievement have yet to be seen (Holmes et al., 2010).

Discussion

From my experiences as an educator, I have found that educators spend a lot of time trying to find the root cause of behaviors, such as a diagnosis or explanation. Although identifying a cause is helpful and can guide our response to behaviors, it is crucial not to delay action while waiting for an explanation. As the researchers have attested, it is unclear whether poor working memory is a cause or an effect of certain learning and behavior struggles. Therefore, as educators, we have to respond to our students' struggles in a way that makes sense for any scenario or cause. In the following section, I present two case studies of students with varying challenges whom I have encountered during my career as an educator. (All names have been changed to protect the identities of these students.). In both scenarios, I used one (or several) of the aforementioned working memory support strategies to address their challenges. As you read through each scenario, see if you can identify each child's potential working memory challenges and what strategies I used to support them.

Scenario 1: Lila

Lila was an extremely hard worker and a very motivated high school student. She had an individualized support plan for a specific learning disability and struggled with reading and writing in particular. She loved to write, however, and had just finished her first essay for my

class. I read through it, eager to see what she had come up with, and felt a mounting pressure in my chest. I noticed that she had written the essay in a "stream of consciousness" fashion, with minimal punctuation or complete sentences. She had also merged multiple ideas into one, seemingly moving on to her next thought before finishing the one that she started with. I gave her feedback and suggestions on her Google Document and sent it back to her. She started working through my comments, and I noticed that she did not make the changes that I recommended. I started to feel frustrated and wondered what I was doing wrong.

After a couple of written back and forth exchanges in her essay with little to no change, I sat with Lila and worked through her writing in person. I asked her to read through her essay with me, and we took turns reading her words out loud. I repeated pieces of her essay where I was trying to emphasize certain areas of confusion. She and I laughed and poked fun at each other, and she started to hear where sentences fused where they should not have. Lila also noticed that we both ran out of breath when there was little to no punctuation.

This went well for a while, and we eventually read through Lila's entire essay. However, I started to panic once again when I saw what used to be her excitement and pride about her essay begin to morph into overwhelm. I pulled out a sticky note and wrote down the first step that Lila needed to take to revise her work: "Add periods after each complete thought." I let her know to meet with me again when this was done, and I added the next step: "Read each sentence out loud to make sure it makes sense." We engaged in this back-and-forth exchange until Lila was once again proud of her work and I, too, felt as though she had a complete piece.

Scenario 2: Gus

Gus "could not sit still" and "did not listen." He was an elementary student who rolled around on the floor when his teacher was talking, hid under tables, and refused to do any work

because he "did not know what to do." At times, his brain could move really fast, so when we did a listening activity, he could forget an important word or message. At this point in the year, we were working on the CUPS revision strategy (i.e., capitalization, usage, punctuation, and spelling) in our small group and he kept shutting down. I said a sentence out loud, and his job was to write it down to the best of his ability, keeping in mind all of the aspects of CUPS. He did not want to revisit his sentence and believed that it was likely all wrong. As a result, he wrote his sentence down, hid it from me, and then erased it before he could make any changes to it. This continued day after day, and I started to feel frustrated that I had minimal evidence of his progress or understanding of how to write a complete sentence. I then decided to flip the scenario.

After I said the sentence out loud, I wrote my own version down, making sure to incorporate a number of incorrect elements. As a small group, we looked at my version and compared it to theirs. Gus began to notice that I struggled with this activity too and that, at times, he did better than I did with it. He showed me how to fix my version of the sentence, one piece of CUPS at a time: C: "No, you need to start with a capital letter, Mrs. Rosenberg!" U: "You forgot a part. It doesn't make sense." P: "Wait, it's a question. You need to add a question mark!" S: "No, you do not spell 'was' like that! It is not 'wuz!'" From there, I watched as he started to show me what he knew, and with that, I saw his self-concept improve too.

Conclusions

In both of these scenarios, I was not confident that Lila or Gus had working memory challenges. Did they exhibit some symptoms of weak working memory, like reading and academic challenges, inability to follow directions, distractibility, and poor self-concept? Yes. Therefore, I opted to use some of the strategies that I knew worked for children with poor

working memory to see if they worked. In these scenarios, they definitely did. Do these strategies work every single day, every single time, with every single kid? Absolutely not. However, the important piece of this working memory puzzle is that, as educators, we try.

Recommendations

This information on working memory can be applicable to a number of settings and people. For the purposes of this article, I will cater my recommendations to educators and children's caregivers, but I am confident that these recommendations can be transferred to many other contexts and individuals.

Recommendations for Educators

As I explained in the introduction to this article, my goal with this piece is to educate and to provide educators with current research and tools from today's experts on working memory. I highly recommend that educators who read this article further explore the corresponding research by reading the sources in the attached reference list for more information. Afterward, I encourage every educator to simply give the recommended strategies a try. I think that you will find that many of these strategies are what we in the field fondly refer to as "best practices" and that many of them can be found in recommended frameworks, like universal design for learning (UDL), or in accommodations sections of individualized education plans and 504 plans.

Recommendations for Caregivers

As the literature demonstrates, there are many reasons why a child may appear distracted, inattentive, or disorganized. If your child is struggling in some of the ways described in this article, please talk to your child's pediatrician and school team. It is essential that children with poor working memory are provided support so that they do not fall behind or "make poor general academic progress" (Gathercole & Alloway, 2007, p. 13). Additionally, repeated academic

failure or redirection can lead to a poor self-concept, as I demonstrated in my second example with Gus. This is devastating, and it is something we can avoid with compassion and early, prompt, and targeted intervention.

Conclusions

As professionals, caregivers, and lifelong learners, we must remain committed to understanding more about students' experiences and the science behind them, including struggles with the brain and learning. Throughout my educational career, I have realized how much I truly did not know before and how essential it is to continue the learning process as an educator. As Maya Angelou famously stated: "Do the best you can until you know better. Then when you know better, do better" (Goodreads, n.d.). We are starting to learn more about how poor working memory truly affects our students and what we can do to mitigate these devastating impacts. However, the process does not stop when we gain this knowledge. As our understanding of working memory and its effects on students grows, so too does our ability to reduce its impact on students. With this awareness, we must act: do our research, get to know our learners and the ways they think, and design our lessons with "all" of our students' needs at the forefront. This is how we will start to transform the learning experience for all of the children in our classrooms, but especially those learners who are struggling.

Resources for the Reader

If you are eager to learn more about strategies or approaches that can assist students in retaining and recalling information, this short list of resources is a good place to start:

1. Beachboard, C. (2022). *The school of hope: The journey from trauma and anxiety to achievement, happiness, and resilience*. Corwin.

(Beachboard explores how to assist students, especially those who have experienced trauma, in creating new neural pathways in the brain through hope.)

2. CAST. (2024). Universal Design for Learning guidelines version 3.0. https://udlguidelines.cast.org

(CAST has a wealth of information about the Universal Design for Learning guidelines.)

3. Florida Center for Reading Research. (n.d.). FCRR student center activities. https://fcrr.org/student-center-activities

(FCRR contains a number of resources, and student center activities in particular, that incorporate the recommended strategies that I detailed, such as modeling, chunking, and including multiple modalities.)

4. Muhammad, G. (2023). *Unearthing joy: A guide to culturally and historically responsive teaching and learning*. Scholastic.

(Muhammad highlights the importance of meaning-making throughout this text, which emphasizes connecting learning to students' identities, cultures, and backgrounds to make learning joyful.)

5. thinkAUM. (2025). What is think SRSD? Think SRSD. https://thinksrsd.com/what-is-srsd/

(Think SRSD is an example of a writing approach that incorporates several of the recommended strategies that I detailed as well.)

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memory?srsltid=AfmBOopZEvkyOIUJQMOmfV7vd2W-KoS1Z5ApjU-4ZR4zt4XGC1LhaFmu

(Warren and Namdaran give a detailed explanation of working memory, its function, and strategies to strengthen it.)

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Working Memory for Educational Psychologists. (2015, March 29b). *WORKING MEMORY. 2– Short term memory* [Video]. YouTube. https://www.youtube.com/watch?v=S9zGpfg0tFw