

# Working Memory

## What is Working Memory?



Working memory involves the ability to keep information active in your mind for a short time (2-3 seconds) to be able to use it for further processing. Working memory is a temporary storage system and is vital for many day-to-day tasks (e.g. following instructions, responding in conversations, listening and reading comprehension, organisation).

Working memory can be commonly confused with short term memory. Short term memory refers to the short term information required for a verbal or visual task (e.g. remembering a phone number, blending sounds into words when reading, remembering objects, colours, location, direction). Working memory involves the manipulation and transformation of verbal and visual information (e.g. remembering instructions and their content to then carry it out, remembering what to say when called upon, keeping your place on the page when reading, reverse sequences of objects/numbers).

## **Why is working memory important?**

Working memory is important for putting information that we are learning together with our current knowledge base (i.e. long term memory). When we hear new information we rely on our working memory to keep the information active so that we can focus, organise and problem solve. Easy retention of information allows our skills and knowledge to be automatic and it minimizes the need to give active thought to each and every step of a task.

Working memory is crucial for academic performance as it is an important part of executive functioning (e.g. planning, initiating, task monitoring, organisation). At school, the areas of learning that are greatly affected by poor working memory are: maths, reading comprehension, complex problem solving, and test taking. The biggest impact on school work occurs from difficulties with maths and reading comprehension.

*Analogy:* Working memory is much like a bucket that you can keep filling up using a glass of water. Every drop that you add remains in the bucket unless over time memory evaporates through lack of repeated use.

In children with poor working memory it is much like the bucket has a hole in the bottom. You can keep tipping in glasses of water (information/knowledge) but it continually drains out.

## **How do we use working memory?**

We use working memory to meaningfully participate in everyday skills such as:

- Responding appropriately when having a conversation.
- Carrying out instructions.
- Reading an unknown word.
- Paraphrasing spoken information (e.g. repeating back information heard/ instructions to clarify).
- Answering questions and remembering what to say when it's your turn to talk (in class, conversation).
- Daily organisation.

- Problem solving.
- Reading comprehension.
- Doing maths sums in your head.

## **How can you tell if my child has working memory difficulties?**

If a child has difficulties with working memory difficulties they might:

- Have difficulty organising/completing a task with multiple steps (i.e. they often stop, or they lose their place).
- Miss details in instructions and fail to keep track of where they are up to with demanding activities.
- Make mistake in writing and counting in the classroom.
- Fail to self correct classroom work.
- Are easily distracted when not highly interested in an activity.
- Find it difficult to wait for their turn (e.g. will interrupt or ask a question and then forget what to say when called upon).
- Have poor organisation skills (e.g. loses belongings easily, loses their place when organising a task with multiple steps).
- Show low average to average language abilities but poor academic performance.
- Have difficulties with reading (e.g. struggle to keep track of their place when reading, struggle to use contextual cues to support word prediction when reading, find it hard to break down sounds in words but then unable to blend the sounds into the word accurately).
- Demonstrate difficulties with maths calculations in their head.
- Find complex problem solving challenging.
- Show slow progress despite working really hard (i.e. it's not a problem of effort, it's just that they can't hold onto information long enough to manipulate and process it).
- Have difficulty starting or completing their work independently - may rely on their 'neighbour' in the classroom to keep them on track and remind of the current task.

## What can be done to improve working memory and it's related difficulties?

- **Consult a Speech Therapist** for a language assessment to rule out possible underlying language concerns and to probe working memory skills.
- **Structure the environment** and use strategies to reduce the working memory load (e.g. break large goals into smaller ones, simplify information, chunk it, slow down the pace of delivery of information)
- **Teach strategies** for coping with working memory inefficiencies (i.e. minimize the load on working memory so the child can increase their capacity to learn).
- **Intensive training on working memory tasks** to strengthen working memory capacity (this is still an area for further research, however, training within specific activities has been proven to increase working memory ability for that activity).

It is most important to target *coping strategies* to support the child to achieve success in the classroom/at home. Training can also be used to strengthen/improve the child's working memory capacity. It is important to note however that improving working memory through specific working memory training can be a lengthy process and requires a high frequency and high repetition of tasks to make any changes. Furthermore, training may improve working memory for a particular skill (i.e. mathematic sums) but may not result in improvements in multiple areas.

Structuring the environment to reducing working memory load includes the following:

- **Break tasks into simple steps:** Provide short, simple instructions and make sure the child has mastered the first step before going onto the next.
- **Use simple language:** Use clear, specific language when making requests and, if necessary, show them what you want them to do.
- **Repeat instructions:** When you have given an instruction to a child, encourage them to repeat it back to you to ensure that the child has grasped/understood what is expected.
- **Repeat activities:** Complete repetitions of new activities to ensure the child has mastered the task. A child with poor working memory will require much more repetition to learn a new task than other children.
- **Use visuals and gesture:** Use visuals to assist the child remember the

steps involved in a task (e.g. morning routine).

- Eye contact: Get close to the child to ensure they are able to hear you and see your face; get down to their level.
- Slow the pace: Slow the pace in challenging activities to allow the child time to process and complete the activity.
- Reduce background noise and distractions: to help a child to maintain attention long enough to obtain the information required to complete a task. Reducing distractions lessens the amount of information the child has to process.
- Recognise what you are assessing, be goal specific – focus on the target at hand rather than multiple targets at once (eg. spelling test – focus on spelling only rather than spelling and letter formation. Instead have the letters presented visually to make the information easily accessible which will then allow the child to focus only on spelling and not remembering how to form the letters as well).
- Connecting information to emotions and things your child already knows can help them remember things better.
- Engage other senses: to help information “stick” (e.g. have your child type math times tables in different fonts, sing them, listen to others say them, trace them in sand).
- Build routines, structure and familiarity: into activities to lessens the amount of new information the child has to process.
- Create a working memory folder or booklet of important information the child can utilise at home or in the classroom to lessen the working memory load (e.g. times tables, spelling rules, alphabet, numerical order from 0-100 etc).
- Develop strategies for coping in the classroom and at home such as:
- Ask for help: Reinforce with the child that it is ok to ask for help or repetitions of information.
- Pair them up with a friend: Allow the child to be paired up to share the load with instructions and completing tasks to allow them to get started straight away rather than wait for the teacher.
- Write/draw clues: Encourage the child to write down verbal information or draw picture/take photos of important things they may need to remember.
- Stay calm: Teach the child self-calming strategies (eg. slow breathing, take a deep breath) when they are feeling overwhelmed or stressed.

Stress and anxiety can significantly reduce working memory capacity.

- Slow down: Allow them to go at a slower pace and encourage them to slow down
- Visualise: Encourage them to visualise what they are hearing
- Limit distractions: Minimise access to screen time, social media

## **What activities can improve working memory capacity?**

- Teach visualisation: Support your child to make a picture in their head of what they have just read or heard. Ask them to mentally picture what they need to do for a specific task (e.g. get everything ready to make a cake) and then get them to draw that picture. As they get better at visualising then just get them to describe what they can see in their head without having to draw it.
- Play games that use visual memory: Matching games are great for visual memory (e.g. Memory, Snap, Pairs, Bingo). You might also make up games that require visual memory (i.e. in the car recite letters and numbers on licence plates then say them backwards).
- Get your child to teach you: Encourage them to explain how to do a new skill they are learning and teach you how to do it. By working on their explanation it will support them to make sense of what they have learned and file it away in their memory.
- Play card games: This can support working memory through both remembering the rules of the game and remembering which cards they have in their hand and which ones have been played already (e.g. Go Fish, Uno, Crazy 8's).
- Support your child to do active reading: Teach them to use highlighters, sticky notes, take notes, underline text to help them keep the information they have read active for long enough to respond to questions about it. Asking questions about what they are reading and talking out loud can also help them to actively read and develop good strategies for all reading.
- Give information in a multi-sensory way: If they are presented with opportunities to process the information in many different ways it will help with their working memory and transferring new information into long term memory.

- Write tasks down
  - Say it aloud
  - Throw a ball back and forth whilst discussing what to do
  - Draw the task
  - Use pictures to support verbal information
  - Demonstrate the task
- Make connections: Use mnemonics (e.g. 'Roy G Biv' for the colours of the rainbow) to help connect information and from new and old memories.
  - Games that involve repeating sequences of information, forwards and backwards: Using colours, shapes, food items, days of the week, clothes, animals, numbers, friends' names.
  - Word list games: such as "I went to the shop/zoo/beach and I saw....".
  - The game 'Guess Who?': The child has to eliminate characters by asking questions about what their character looks like using memory of the facial features.
  - "Simon Says" and other instructional games: Give the child more than one instruction at a time and see if they can remember them all (e.g. "sit down, put your hands on your head then blink three times" or 'Obstacle Courses' where your child needs to complete an obstacle course to reach a 'goodie' by remembering the instructions to get there (e.g. 'Go under the table, behind the chair, and through the tunnel")
  - Threading beads/building a block tower: Sit in a circle with a group/or face to face and each person takes a turn to say two colours that you both need to thread/build. Take in turns to tell each other two colours and slowly increase the number of colours to get to thread/build onto their tower.
  - "Get the Loot": Put pirate hats on and pretend to be pirates, set up two pirate ships with pictures of items for the 'loot' and explain that each child needs to get 2 things from the other pirate ship to bring back. Get the child to say the things they need to get 3 times before they go and get it. Increase the number of items to get.
  - "Picnic time": Give your child the name of 2-3 things that they need to collect to bring to a picnic. Have them collect the items and bring them to a picnic rug (you can use pictures of items or the real item).

## **Why should I seek therapy if I notice difficulties with working memory in my child?**

Simply put, working memory difficulties result in missed learning opportunities.

Over time these frequent missed learning opportunities may result in slow educational progress and poor academic achievement

as well as challenges with every day tasks like dressing, packing school bags and develop independence in regular routines like bedtime readiness.

## **If left untreated, what can difficulties with Working Memory lead to?**

When children have difficulties with working memory, they might also have difficulties with:

- Developing literacy skills such as reading and writing.
- Mathematics.
- Completing higher level education tasks.
- Progressing at the same rate as their peers which may lead to social isolation and reduced confidence.
- Reaching full academic potential at school.

## **What type of therapy is recommended for Working Memory difficulties?**

If your child has difficulties with working memory it is recommended they consult a Speech Therapist or Psychologist.

Contact us today to make an initial enquiry or book an assessment for your child  
on 1800 KID SENSE (1800 543 736)

