The Working Memory Action Research Project – January to July 2019

**Introduction**

Building on the success of a smaller, pilot project that involved 4 schools in the previous academic year Exeter Consortium offered a course to develop early years professionals’ understanding of the importance of working memory. The course ran over two terms and was led by Jon Maxwell-Batten, retired Educational Psychologist, Tania Beard, Headteacher of St Martin’s Primary and Nursery School and Mel Turl, Assistant Head and Early Years Lead at St Martin’s Primary and Nursery School.

The aims of the project were to:

* Develop professionals’ understanding of how to strengthen children’s auditory working memory to enhance prerequisite learning skills and self-regulation so they can plan, organise, pay attention, think flexibly, self-monitor through whole class delivery, interventions and working in partnership with parents.
* Utilise a screening process in order to measure the impact of the interventions that support children in strengthening their working memory.
* Broaden the scope of an initial research project which looked at how strengthening children’s working memory in the early years can improve outcomes at the end of EYFS.
* Further develop the ways in which it is possible for schools to work in partnership with parents to support them to be partners in their child’s learning journey. (The working memory activities that parents can be given to do with their children require no knowledge of the curriculum unlike phonics or number home learning activities.)

The course participants were made up of a majority of early years practitioners but included professionals from other settings and age ranges. Everyone who attended the course was given a copy of 2 books with games that can be played in the setting/school or at home. The books were written by Mark Hill and Katy Hill and are currently in print.



The books give many ideas for games to improve children’s working memory and these can be adapted and changed to meet the needs of the child/ren, school or setting.

Each school/setting that took part in the project has given and overview of how they implemented what they had learnt and shared a story about an individual child. Not all settings/schools have supplied quantitative data but the stories they have shared gives an indication of outcomes for the children. The stories have been anonymised but if there is a particular approach you are interested in you can contact Tania Beard at St Martin’s C of E Primary and Nursery School -head@stmartinscranbrook.devon.sch.uk - she will liaise with the school, and, if they are willing, will arrange an email introduction.

**School 1 – Primary and Nursery School**

We screened the 7 children we were concerned about and they had packs sent home, they were on a rota for working memory interventions (visual and auditory). We had good conversations with parents and a good level of response on the slips we sent home with the children for feedback. Through the year focussed on the 7 focus children whilst ensuring that there was working memory provision for the whole cohort. One of the key areas for us was improving children’s ability to follow instructions (LEAP provided good evidence for showing how this key learning skill was developing). All 7 focus children have improved their working memory score by 10 points or more.

Our story is about one little boy, who found it hard to focus; he couldn’t sit the right way around, he played on his own, and was not interacting with others or benefitting fully from the environment. Feedback from the working memory games showed that his parents were doing a lot for him, in fact his parents were doing nearly everything; he had no opportunities to develop his independence at home and even in school an older child was collecting lunch box without the child in question even realising he needed to get it. This child is now aware of our expectations of him, he has awoken, he is responding to questions, he is interacting, he is taking responsibility for his own things. I have learnt to look at the adults around the child as well as the child themselves.



**Nursery Settings**

The bit that has really stuck out for us and what we want to take it into our base nurseries is the necessity of ensuring that we support children in learning to wait. Jon Maxwell-Batten talked about this and this has stayed with us – most of our nursery plus children can’t wait – so we have started looking at ways to support them in learning to wait a little bit longer.

|  |  |
| --- | --- |
| Number of Children in Working Memory Focus Group | 5 |
| Boys | 3 |
| Girls | 2 |
| Children on track in September for GLD | N/A |
| Children who achieved a GLD | N/A |
| If not Reception children – just a sentence about children’s progress from starting point  | No children went backwards1 children made less than 9 points progress4 children made between 11-14 points progress |
| Average improvement in working memory score per child | 11 POINTS |
| Parental Engagement – was is high, medium, low or non-existent  | NONE  |

**Primary School 2**

I was working with a Year 1 group who didn’t get GLD last year – they were low in all areas. They did working memory games at school and we sent packs home. It was hard to get the parents on board with the activities. One boy in particular has improved by 10 points and he has just passed his phonics screening – I would never have predicted that outcome at the beginning of the year; he is now following instructions. This child had no independence initially.

**Primary School 3**

Reception class – I looked at my class and decided to screen a little group who hadn’t scored highly in the language assessment. I ended up working with 3 girls; I worked with their parents and supported a TA who worked with the children on auditory listening skills. I also tried to embed developing children’s working memory in in my general whole class input. One girl who on screening who was shown to have a poor working memory was a surprise – she has 2 siblings who had not had any difficulties and very supportive parents. The girl was very slow to get going with things, I initially asked to have her hearing checked and she did have a problem, her hearing was sorted but then she needed to catch up. She has reached expected level now and I feel that developing her working memory has enabled her to make the accelerated progress she needed to make to catch up. The other 2 haven’t made expected level for the end of Reception but they have made progress from their starting points.

|  |  |
| --- | --- |
| Number of Children in Working Memory Focus Group | 3 |
| Boys | 0 |
| Girls | 3 |
| Children on track in September for GLD | 0 |
| Children who achieved a GLD | 1 |
| If not Reception children – just a sentence about children’s progress from starting point  | N/A |
| Average improvement in working memory score per child | 12 |
| Parental Engagement – was is high, medium, low or non-existent  | High x 2 Medium x 1 |

**Primary School 4**

Reception class – only 2 children in the whole cohort were expected to make GLD when they came up from nursery. I identified 2 groups of 7 – 1 of these groups needed a big boost to get them anywhere near achieving a GLD. 6 of the children in this group achieved a GLD which they weren’t on track to do when they entered Reception. I did whole class games and additional targeted work for this group. Their parents were invited in; they came in and played a working memory game with their children, they then rushed in the next Thursday (my next teaching day) to change the games – there was lots of enthusiasm. We didn’t do any parent slips this time as we didn’t want any barriers to the parents doing the games with their children but we are planning to use slips next year and we are going to screen everyone from September 2019. I had 2 really passive girls – not good parental involvement – but these girls really moved forward and challenged themselves with the working memory games. These 2 girls are really confident and ready for Year 1.

**Primary School 5**

I work with 8 KS2 SEND boys who are taken from main provision in mornings for English and maths and I incorporated working memory games into the life skills sessions – we played; Kim’s game, shopping list, pairs, story boards, etc. My next step will be to make up the packs and get the support from home.

|  |  |
| --- | --- |
| Number of Children in Working Memory Focus Group |  14 |
| Boys | 9 |
| Girls | 5 |
| Children on track in September for GLD | 0 |
| Children who achieved a GLD | 6 (3 only just missed out) |
| If not Reception children – just a sentence about children’s progress from starting point  |  |
| Average improvement in working memory score per child | Average score in March –Boys 30Girls-20Average score in July-Boys 16 Girls 13 |
| Parental Engagement – was is high, medium, low or non-existent  | Only gave packs to 9 children as targeted those who came to the meeting re the working memory games. Parents that did this were either high engagement or medium ( 2 who only seemed to change games 2/3 weeks at a time) |

**Hospital School**

Our work is shared across the 2 sites and the nature of children being in hospital means that they come and go. We have introduced working memory games to our practice in the hospital school. In addition to working in the hospital school I tutor 2 EAL children. I asked their parents if I could use working memory games at the start of every session and this has proved really interesting. The older child, especially, needed instructions repeated – he is now adept at following instructions and there is no need for me to repeat instructions. Developing his ability to do this has really helped him remember other things too. His recall and linking skills have really improved. It has had a positive impact on his English and maths.

|  |  |
| --- | --- |
| Number of Children in Working Memory Focus Group | 2 |
| Boys | 2 |
| Girls | 0 |
| Children on track in September for GLD | N/A |
| Children who achieved a GLD | N/A |
| If not Reception children – just a sentence about children’s progress from starting point  | Both children are behind in their ARE at KS1 and KS2. |
| Average improvement in working memory score per child | KS1 pupil made a 9pt improvement and the KS2 pupil made a 13pt improvement. |
| Parental Engagement – was is high, medium, low or non-existent  | Low parental engagement but I started each tutoring session with Working Memory activities. |

**Primary School 6**

Staff changes have meant that it has been a challenge for us to do all we wanted to with working memory. However, we screened the children in Year 3 and Year 1. In Year 3 we identified several boys with a poor working memory and in Year 1 we screened the children who hadn’t achieved a GLD. Within this group 3 boys in particular were highlighted and I will be working with them. We are planning to use working memory games in our practice in the future. We also want to look at how independent children are at home – parents need to be encouraged to allow children to be independent.

**Lead Nursery and Satellite EYFS Settings**

1st Practitioner

We screened our case load for working memory – all children have done reasonably well from their initial starting point. The children who haven’t made as much progress are children in care or are from very difficult backgrounds. There are 2 little girls who particularly spring to mind – 1 was referred in because she was painfully shy, wouldn’t speak and would only communicate non-verbally with her key worker. I built a relationship with the little girl, there were S&L difficulties but we decided to go in initially with a 2 pronged approach of Thrive and working memory activities. The booklets didn’t work for nursery chidren; we had to make the activities real for children. I spent a lot of time with a tractor with 5 animals in the back (who make a noise). We played lots of games where the farmer wanted to go to market and buy a pig for example – the little girl found it really hard to hold information in her mind – we mixed up our approach with shopping games and increased distance the child had to travel across the classroom to fetch the objects. By the end of the period of work she could remember up to 3 animals, I did lots of listening games and phonics games. She has is now confidently playing and interacting with her peers, she is still a bit reticent. The other little girl is a bit of a puzzle – she has amazing auditory memory in terms of remembering stories and talking about what she had done but couldn’t follow an instruction – found she had a poor visual memory so we have done lots of pairs games, etc to support her.

2nd Practitioner

It’s been tricky but I focussed on 2 children, one whose attendance has been shocking – we did all the games but he has been off for 8 weeks. We had a few other children who scored highly on screening to show they had a poor working memory but I thought this was because of attachment difficulties – they have improved their score for WM due to the relationship they have created with an adult. One child wouldn’t move off carpet, he wouldn’t engage with anyone other than his key worker, he would become angry, lash out and run away or he would just cry. When I started working with him I understood that he wanted security and that he was anxious, I observed him with staff and I noticed his initial reaction was to throw himself on the floor but when he was given a visual cue he would respond calmly. When doing activities with him he asked to see his key worker so he could avoid doing the activity. He slowly extended his time with the activities, he was completely random with his knowledge, he couldn’t focus, he was a real challenge. We started with ready, steady go instructions in the soft play – he has got to the point where he is fully accessing the whole of the environment happily and he has also made a couple of friends. However, when I went in for sessions he was dysregulating and going backwards. So it was decided that, as he is engaging in the environment and learning from it, I will step back for the moment with a view to picking the working memory work up again when he is feeling calmer. Nursery staff are working on incorporating WM games into their practice.

I learnt that if he was asked a question he would fill the space of time for a reply with random answers and we worked out that he was taking 10 to 12 seconds to process the question but knew he should say something after someone asked him a question. So he would just say random words until he had processed the question and then he would often give the right answer.

I have been working with a little girl for a while and I thought that she would be good to try working memory approach with as she often gave random responses. The child managed the working memory activities relatively easily – she moved from a score of 30 to 24 – her working memory has improved and this work has helped us to narrow down what the problem may be – we have now referred into social communication. The improvements haven’t led to significant changes overall – they have helped us plan our way forward with her.

|  |  |
| --- | --- |
| Number of Children in Working Memory Focus Group | 10 |
| Boys | 7 |
| Girls | 3 |
| Children on track in September for GLD | N/A |
| Children who achieved a GLD | N/A |
| If not Reception children – just a sentence about children’s progress from starting point  | No children went backwards4 children made less than 5 points progress3 children made between 7-11 points progress3 children made between 14-19 points progress1 child will transfer to YR at ARE |
| Average improvement in working memory score per child | 7 POINTS |
| Parental Engagement – was is high, medium, low or non-existent  | NONE  |

|  |  |
| --- | --- |
| Number of Children in Working Memory Focus Group | 10 |
| Boys | 5 |
| Girls | 5 |
| Children on track in September for GLD | N/A |
| Children who achieved a GLD | N/A |
| If not Reception children – just a sentence about children’s progress from starting point  | 1 child made 10 points progress1 child made 9 points progress1 child made 6 points progress1 child made 5 points progress2 children made 4 points progress1 child made 2 points progress2 children made 1 point progress1 child went backwards 3 points (possibly over scored the first time) |
| Average improvement in working memory score per child | 4 |
| Parental Engagement – was is high, medium, low or non-existent  | N/A |

**Primary and Nursery School 7**

Nursery - We also needed to tweak activities in book and use real objects. We screened everyone and targeted children who were particularly poor. Everyone improved even most significant SEND. We did working memory activities in the morning and afternoon as our children are part time. The children loved it! We did games to develop auditory and visual memory. The working memory project tied in with the Talk Matters project. We have put working memory games into interventions in guided sessions and whole class inputs. When we were reading stories with the children we did a lot more recapping on facts that we had already gathered from the text to improve children’s working memory. We sent home activity suggestions and held a parental engagement workshop – lots of families came in and they were shown activities they could do at home. I am going to do an inset for staff next year. Children started with a stronger visual memory and then it changed to auditory being better after the interventions and whole class input.

The child I want to talk about is quite a conundrum; if you looked at her you would think that she was very together but whenever she spoke it wasn’t always relevant, she had amazing language in a social situation but when it came to other language she was away with the fairies. She was oblivious to other adults – after engaging with working memory activities she has become much more independent, she has learnt to wait her turn in conversations, her confidence has grown and she has become more thoughtful. She is now following 4 step instructions and remembering 4 objects in order.

**Primary School 8**

Reception – 2 classes – 1 class screened for WM – obvious children came up but there were 2 surprises – both girls – one disorganised- one just really slow to do anything. I spoke to the parents of these 2 girls, both sets of parents were really on board and wanted to support. In addition I have done working memory games with the girls in intervention groups. Both girls have become more organised, more switched on and the one who was behaving poorly at home is now behaving better. There is a boy who finds it hard to listen and focus, Mum has questioned ADHD so I suggested working memory games, Mum has been really pleased with the changes. In September we are going to screen the whole cohort and send packs home.

**Primary School 9**

I teach in Year 1 – we have 52 children across the two classes. We screened 15 and a group of 8 were identified as having poor working memories; 7 boys and 1 girl – this was our focus group. We have also fed working memory into our whole class teaching – the children have responded really well and parents have come in and been interested about carrying it on at home. The 8 children were not on track to achieve a GLD and 6 of them are leaving at Year 1 expected. One little girl was very passive and both her older sisters have challenging behaviour so she has tricky home life; she struggled coming into school so she had her working memory activity in the morning, it helped her settle, she is now much more vocal on the carpet and can now create a sentence for herself. Her confidence is much improved, she used to cry in PE and now she is happy to join in. The little girl is very enthusiastic about doing the working memory games at home. Going forward in September we want to keep up with whole class approach and look at doing packs for everyone to take home.

**Primary School 10**

Year 3 – we screened the whole year group (90 children) and came up with 25 children (8 of whom were girls) who we felt might benefit from the working memory approach. We sent packs home with covering letters and spoke to the children about what we were trying to do. Parental engagement was a bit patchy, with 44% who engaged. Some children really loved it and some thought they were ‘too cool’ for some of the activities. We had some families who were a bit sporadic in their involvement and who didn’t do the daily approach. It was logistically challenging but it did all happen. Some children have really improved but there are no clear patterns. Not all the children who engaged reduced their score. Teachers felt that parental engagement was key so they are looking maybe to focus on a smaller group next year and devote some TA time so that it can be consistent in school. We will continue to work with the families who really want to engage. We had some great feedback from some parents that was very helpful. We might try the coffee/chat/demonstrate how the activities work way forward to engage parents.

One boy with huge speech and language issues who was still on P-levels in Year 3 and who would dysregulate often as he couldn’t make himself understood took part in the working memory project. He has transformed and made some big progess over the past term – he has done his first star reader test – he has also had other inputs but the working memory has played a part – he is more confident, more happy to get things wrong and he is better at waiting and taking turns. He also is making some progress with Maths and for example can now count in 10s across 100s barriers.

|  |  |
| --- | --- |
| Number of Children in Working Memory Focus Group | 25 |
| Boys | 17 |
| Girls | 8 |
| Children on track in September for GLD | not early years setting |
| Children who achieved a GLD | ditto |
| If not Reception children – just a sentence about children’s progress from starting point  | Of the 11 children who had good parental engagement, the average improvement was 5 points (gender made no difference). All bar 2 made progress. 6 made 6 or more points of progress3 made between 8 & 12 points progress.In terms of how many have made it to ARE:of the 25 children targeted11 are ARE14 are WTSeveral of the children (upwards of ½) have significant SEN (autism/ADHD/home issues/EAL) which might have affected their ability to engage.Over ½ also have Thrive intervention |
| Average improvement in working memory score per child | Overall - 4 points (ranged from 12 points down to 0 points) – but also see comments above |
| Parental Engagement – was is high, medium, low or non-existent  | Medium – about 45% |

**Primary School 11**

We have a Foundation Stage unit – the team worked as whole to watch the power point form the session. The team all took part in the memory games themselves to gain an understanding how this feels for the children. Each Key worker then selected children they felt needed to be screened. Each key worker chose how they would put the intervention in place. One lunch time group, one whole class session, two individual sessions. We created packs that went out to parents and we had varying degrees of feedback in their individual contact books. We adapted the paper based games to make them even more enticing. The team are developing the ideas from the book and creating new games so packs will be ready for September. We will introduce the games during our September parents Phonics sessions.

One girl could memorise all of the individual sounds but when it came to tricky words and digraphs she couldn’t remember them at all. Her language was great and she told her own stories and information in detail. It was really interesting. One of the TAs worked with her and found that she could only keep 3 pictorial items in her memory at one time, now she can remember 6 things. She can also now identify some the of tricky words. The impact the visual memory work has had is fantastic and she is really excited by her progress in being able to read words in books.

**Primary School 12**

Reception and Nursery teachers have led on the project.

Reception - We have had a bit of year and haven’t got as far ahead as we wanted but we have focussed on the group that were really in need of support. The teacher screened the children who weren’t going to get GLD and she identified the 3 boys who were suffering from ‘death by intervention’ – none of the interventions were having any impact; these children couldn’t learn what was being taught as their working memory wasn’t good enough. The teacher consciously decided to stop interventions and do working memory activities instead – she worked with the children individually, in groups and as part of the whole class. The children engaged with memory games, story telling, re-telling stories, snap games, etc – they loved it! The boys who had been having lots of interventions really loved it and felt they had been let of the hook! 2 out of those 3 got GLD and they were not on track in January. There has been a massive improvement in the reading ability of these boys because they can now listen. In September we have a large cohort with children from 14 different settings – we are going to screen the children from other places (not from own nursery). We aren’t using the sheets as sheets we have made ‘real things’ games – some parents are going to help to create making the packs.

Nursery – screened all children – looked at boys, girls and younger children who would be with us for 2 years. The children who came out from the screening were not a surprise. We have changed our language in the nursery – it was very simple and we have extended it – the children are waiting more now and their listening skills have improved it over time.

**Supply Teacher**

I have been using 2 step moving to 3 step instructions in my practice when I go into different schools, I clap in different rhthyms to gain children’s attention – you can really see those children who struggle to follow a rhythm also struggle with more than 1 step instructions. I have been using the games as filler activities – the children love them! I will now be able to put my learning into practice when I start as a nursery teacher in my new school in September.

**Conclusion**

We cannot of course claim that all the progress that children have made is due solely to the working memory intervention as there have been many other things happening for these children and they travel along their educational journey. However, there do seem to be clear indications that improving children’s memory does have a positive impact on children’s ability to learn as well as their ability to manage their feelings and behaviour. These findings replicate the findings from the small project that ran the previous year. The other key finding is that the level of parental engagement is a significant contributary factor to the children improving their working memory. Parents, on the whole, find the working memory games very accessible and enjoy playing them with their children. The majority of the schools and settings involved in the project are committed to continuing to include games and activities to improve children’s working memory in their practice.

*Additional Resources to Support Schools in Strengthening Working Memory in Children*

Early Listening Skills by Diana Williams. Speechmark - a really good photocopyable pre-school resource and for the children at KS 1 who are significantly delayed etc

There is a trilogy starting with Developing Baseline Communication Skills and two further cumulative books building up through KS2, Catherine Delamain and Jill Spring, Speechmark. These books have an assessment system and record keeping section and very easy to use activities fitted to whichever part of the curriculum you want to embed at whole class or small group. the advantage being that some children will be aged say 6 or 7 but functioning at say a 3 year old level due to development but not brain impairment ... teachers and TAs have found these books useful. They essentially look at the early prerequisite developmental areas such as turn taking, (waiting) awareness of others etc before engaging in cognitive skills like auditory memory etc.

A really powerful trilogy which could work with KS 2 called The Central Processing Kit, Mary Ann Mokhemar. Linguisystems but obtainable via Amazon / Wimslow but suggest look for secondhand copies as quite expensive but worth it in my view.