

Can research into the development of working memory explain learning in school?



Working memory, in psychology, is a concept developed from short-term memory (STM). Whilst short-term memory focuses on holding limited information over a limited amount of time, working memory proposes a more complex, multicomponent system and that this system 'underlies human thought processes' (Baddley, 2003). Many researchers have conducted studies into how the development of working memory can affect the development of learning; the development of working memory can have a direct effect on cognitive functions that can be crucial for functions such as learning, comprehending, and reasoning (Baddley, 2006). However, to what extent can research into the development of working memory provide answers? This essay hopes to examine the usefulness of research into the working memory model to explain a 7-year-old boy's learning in an academic environment.

Firstly, a highlighted issue in this scenario is William's struggle with both mathematics and reading, whilst his classmates excel; which research noting the relationship between working memory and these two factors. Passolungi and Siegel (2001), in their study, compared one group of 23 children who had poor arithmetic problem solving skills and a group of 26 children who were good problem solvers. It was found that the poor problem solvers struggled to retain numerical information, which would provide an explanation for William's struggles with mathematical learning - perhaps his working memory is not as developed as other children's, who's working memories begin to mature at around the age of 5. However, there are several disadvantages to this study. First, the reliability of the results can be tested due to the theory of self-fulfilling prophecy; it states in the study that

one of the ways the children were deemed as 'poor problem solvers' was feedback from teachers, therefore, if a child is already aware that other people see them as bad at arithmetic, then surely this would influence them to embody this persona, leading their problem-solving skills to worsen. Therefore, are these the results of genuine poor problem solvers, or of children believing that they are bad problem solvers due to their teacher's opinions? If this were the case, then the results of this research would not be useful in explaining William's learning as the findings cannot be generalised. On the other hand, however, further research confirms the role of working memory within arithmetic problem solving, in particular, the central executive. In two experiments, Rammelaere, Stuyven and Vandierendonck (2001) investigated the role of the central executive in multiplication sums and a set of one-digit addition and it was concluded that the central executive in working memory does play a part in arithmetic problem solving. Furthermore, this further supports that William may be falling behind in mathematics compared to the other pupils in his class due to a potentially underdeveloped or damaged working memory. Although, the study by Rammelaere, Stuyven and Vandierendonck (2001) doesn't specify how exactly the central executive affects arithmetic, lessening the extent to which this research can be applied to William's learning in school.

In addition to this, further research can provide explanation for William's learning when it comes to reading. As backed up by research, William shares similarities with that of children with learning disabilities. Research states that children with learning disabilities tend to have problems with reading as they have a poor working memory, in particular, a less developed

phonological loop. In a study conducted by Gathercole, Alloway, Willis and Adams (2006), they assessed children's working memory in relation to reading ability by getting children to complete phonological short-term memory tests, in which the scores fell short. This would suggest that reading ability has an association with phonological processing abilities, therefore, William's slow progress when it comes to reading could be due to issues with his phonological loop. Or, perhaps, this research indicates that William may have a learning disability and that there are associations between this and poor working memory. Although, it should not be presumed straight away that William has a learning disability as his working memory may just be taking longer to develop as, according to Gathercole (2004), working memory can take up to the age of 14 to fully develop, so with support and patience from teachers and peers, William's reading ability could improve. To further support that there is a correlation between working memory and reading, Alloway and Alloway (2010) conducted a longitudinal study looking at the relationship between working memory and comprehension ability on children when they were aged 8, 9 and 11 through working memory assessments, it was concluded that working memory should be considered as an important factor that influences comprehension ability and comprehension development. However, that's as far as the interaction goes within this study as the none of the results turned out to be significant. Additionally, it is also difficult to generalise these findings to William's learning in school as this was a longitudinal study, meaning that the participant drop-out rate is likely to be high, therefore questioning the validity of the results.

Furthermore, research into the development of working memory can explain William's attention in school, to an extent. As described in the scenario, William often becomes distracted causing him to never see tasks through and, according to research, there appears to be a relationship with this and working memory. In a study carried out by Fockert, Rees, Frith and Lavie (2001), it was found that that working memory has an influence on attention, potentially explaining William's lack of focus when it comes to learning. With the use of distractor tasks and neuroimaging on their participants, they found that working memory plays an important role in distractor processing and that a damaged frontal lobe can affect working memory's part in attention and focusing. Therefore, this could explain William's learning in school as it leads to suggest that perhaps there's a neurological cause for his forgetfulness and the fact that he becomes distracted often. Although this research into working memory can provide an answer to William's learning in school, it's difficult for its findings to be supported by further research due to the nature of the study. This study involved neuroimaging, which is known to be a somewhat unethical method due to the fact that it could leave the participant with radiation exposure. Additionally, it is difficult for the findings to be generalised to William as studies using neuroimaging tend to focus on adults; whilst William is only 7 years old, his brain and his working memory will continue to develop right through his adolescence (Gathercole, Pickering, Ambridge and Wearing, 2004), showing that research into working memory may not always be useful and effective. Therefore, it is only to a certain extent that this type of research into working memory can explain William's behaviour in school as it is less likely to be repeated due to its nature, causing a lack of reliability, making the findings difficult to be generalised to <https://assignbuster.com/can-research-into-the-development-of-working-memory-explain-learning-in-school/>

William. Moreover, research into working memory is only really effective to the extent in which short term memory is being discussed. In reference into William's forgetfulness, it can be argued that theories into long term memory may be more relevant, such as Retro-active Interference (RI). This is when forgetting occurs when new information is presented to an individual, therefore in William's case, he may be forgetful due to new information constantly being presented to him in a learning environment; forgetting is often induced by mentally challenging tasks (Dewar, Cowan and Della Sala, 2007).

Additionally to this, research into working memory can be useful in explaining the social aspects of William in school. According to the scenario, William started the beginning of year 2 as a sociable child who was keen to learn, but eventually became reserved. It would be interesting to evaluate how research can explain the potential correlation between working memory and his social ability. A possible explanation for the change in William's behaviour could be potential anxiety. Peters (2015) looked into the relationship between working memory and anxiety and found a correlation between the two. He gave 44 students the Reactions to Test (RTT) in order to measure their levels of anxiety and a series of Automated Complex Span Tasks (CSTs) to test their working memory performance, which led to findings that suggest that, overall, those who scored higher on the anxiety test were more likely to have a weaker working memory performance. This research could explain why how William's social ability can have an interaction with his learning, in relation to working memory. According to the scenario, William is not as advanced as the others in his class when it comes

to mathematics and reading and seeing this would certainly have an effect on his emotional well-being; inevitably causing anxiety. This anxiety, according to the above research, would then go full-circle and effect his working memory negatively, so that he continues to perform poorly at these subjects in school. However, research into working memory doesn't really look into how working memory can affect sociability but more so how sociability can effect working memory, which is useful but leaves quite a large gap in the current knowledge of working memory and therefore, how it can explain William's learning in school.


To conclude, the concept of working memory has developed over the past few decades, but through people researching how working memory is changing and influencing individuals, it can be seen as a well-respected theory into memory that can provide explanation for how we remember, and how we learn. Research provided above has demonstrated how useful and effective research into working memory can be when examining children's learning, however, research into the working memory cannot explain all aspects of learning as it focuses mainly on the concept of short-term memory; the role of long-term memory in a child's development being 'put to one side' (Henry, 2012).


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