



The Neuropsychology Of ADHD And Applying It To Learning In The Classroom

Attention in the classroom



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<https://www.trainingzone.co.uk/deliver/training/informal-learning-critically-important-but-neglected>

About this guide

This guide aims to help teachers gain a better understanding of the brain of a child with ADHD, and it will show how the component of attention in neuropsychology is applied to learning in a classroom setting. Students in both primary and secondary school are the focus of this guide and to be more specific, students with ADHD will be looked at to see how neurology can be applied to make learning more effective for such students.

What is ADHD?

According to various articles, Attention Deficit Hyperactivity Disorder, otherwise known as ADHD, is said to have been on the rise in the UK over the past few years (Greenway & Edwards, 2020). For example, one study that was conducted by McCarthy, Wilton, Murray, Hodgkins, Asherson & Wong (2012) found that the prevalence of prescribing ADHD medication increased between the years 2003-2008. And in addition to this, one study that had a sample of 593 primary school children and 1673 secondary school children found that prevalence in ADHD correlated with gender and amongst other factors. For example, they found that 70% of the boys had ADHD as opposed to only 29% of the girls did and similarly, the secondary school sample had 60% males and 39% females with ADHD (Papavassiliou, Andreou-Filimi, Dimitriou-Papavassiliou, Mavrikiou & Constantopoulos, 2008). On the other hand, one criticism of this study is that there was not an equal amount of students from both primary and secondary schools, making their results disproportionate.

ADHD is a neurobehavioural disorder (Psychology Today United Kingdom, n.d.) meaning that it is a brain disorder that often develops from a young age, and it is recognised through behavioural patterns (Sparks, Meaburn, Dumontheil, Porayska-Pomsta, MacSweeney, Tolmie & Thomas, n.d) because it causes delays in certain parts of the brain that is in charge of causing normal regulatory behaviour (Crawley, 2014, as cited in Greenway & Edwards, 2020). There are various symptoms of ADHD which can be placed into subgroups. These include impulsivity, inattention and hyperactivity, all of which are said to prevent normal functioning and development from occurring (Greenway & Edwards, 2020) and are symptoms that teachers can look out for in their students. Inattention is said to be the most common type of symptom of ADHD, and children in this subgroup often have difficulty with controlling their attention, can be easily distracted and have difficulty following instructions (Sparks et al, n.d). Those in the hyperactive or impulsivity subgroup fidget quite frequently, talk excessively (Greenway & Edwards, 2020) and show very high levels of physical activity (Sparks et al, n.d). However, in the early 70s, Douglas (1972) argued that having an attention deficit was the main abnormality of hyperactivity/ADHD rather than excessive activity. He argued that having a short attention span may result in fragmented and disorganised behaviour which in turn can contribute to leaving an impression on others that the child is excessively active.

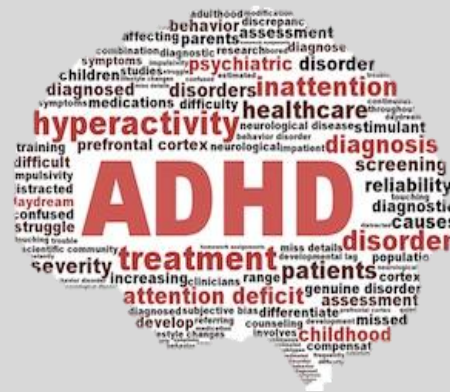
To get diagnosed for ADHD by a medical professional, children have to meet a number of specific criteria for inattention or hyperactivity. The child will have to show up to 6 or more symptoms of inattentiveness or hyperactivity continuously for up to 6 months (NHS, 2018). For example, the criteria for inattentiveness include; often making careless mistakes such as in schoolwork, being forgetful or loses things regularly, finds it difficult to focus on doing tedious or time-consuming tasks, unable to carry out instructions, has difficulty organising tasks and many more (NHS, 2018). The criteria for hyperactivity include many signs such as finding it difficult to sit still even in calm environments, excessive physical movement, acting without thinking of the consequence beforehand and many more. The NHS suggests that if the child's guardian is convinced that their child may suffer from ADHD, then they should raise any of their concerns to the child's teacher, the school's special educational needs co-ordinator or GP. To treat ADHD, medical and behavioural treatments are used. The behavioural treatment can involve therapy, parent training (Psychology Today United Kingdom, n.d.) and adequate educational support (NHS, 2018).

The neuropsychology of ADHD

Studies such as those that were conducted on adopted children with ADHD and twins (Sharp, McQuillin & Gurling, 2009) have found that ADHD is familial and is inherited through genetics (Wilcutt, Brodsky, Chhabildas, Shanahan, Yerys & Pennington, 2005). Despite this, genetics may not be the only factor that causes ADHD as there are also environmental factors that could play a part.

For example, exposure to substances such as alcohol and tobacco as a fetus during pregnancy (Brookes, Mill, Guindalini, Curran, Xu, Knight, ... & Chen, 2006), being exposed to lead after being born, and even trauma to the brain due to a head injury (Nigg, 2006) can all cause children to suffer from ADHD.

There are core areas of the brain that is important for attention, cognition and general self-regulation (Teeter, 2000) however, research shows that those with ADHD "have widespread anatomical differences from controls" (Singh, 2008, p.3) because they have "smaller volumes in the dorsolateral prefrontal cortex, the caudate nucleus, the corpus callosum and the cerebellum" (Singh, 2008, p.3). This suggests that the brain of those with ADHD is structured differently to those who do not have the disorder. This can also be seen in a neuroimaging study that was conducted by Hoogman, Bralten, Hibar, Mennes, Zwiers, Schweren, ... & de Zeeuw (2017) in which they analysed MRI scans of 1713 ADHD participants and 1529 participants who did not have ADHD- making them the control of the study. Similar to Singh's (2008) study, Hoogman et al, (2017) found that the participants who had ADHD had a much smaller volume of certain components of the brain such as the amygdala, hippocampus and intracranial volume as opposed to the control group who did not have ADHD.



<http://www.educationalneuroscience.org.uk/resources/neuro-myth-or-neurofact/is-adhd-on-the-rise-in-uk-schools/>

Ways in which ADHD affects kids in school

The symptoms of ADHD would prove to cause many difficulties for children in schools. It can cause them to underachieve in school, and they may have issues with discipline as well as having issues with their social skills (NHS, 2018). The majority of the national curriculum for Education requires for students to pay full attention in lessons at all time to achieve high grades. Seeing as inattention is one of the main symptoms of ADHD, students who suffer from the disorder must have difficulty in learning comfortably in schools.

The most obvious effect that ADHD will have on those who suffer with it is that they would struggle to concentrate in lessons which would then result in underachievement. For example, Zentall (1993) argued that ADHD students are more likely to achieve lower grades and perform worse than those who do not suffer from any disabilities.

According to Anderson, Williams, McGee, & Silva (1987), as cited in Zentall (1993), 80% of 11-year-old students with ADHD were reported to be behind other students academically by at least 2 years in subjects such as English and Maths. This lack of concentration can also be seen in a study that was conducted by Parsons et al (2007) in a virtual reality classroom, in which they compared the performance in the attention of 10 boys who had ADHD with 10 boys who were the control group. The results showed that the boys with ADHD made more errors than the normal control group, they showed overall more body movement and got more distracted in the virtual reality classroom and thus proving that ADHD would cause a lack of concentration in classrooms too. Also, students with ADHD are often perceived as being rather disruptive and so, they get rejected by their peers (Johnston, Pelham & Murphy, 1985). In addition to this, students with ADHD often portray difficulty with organising their behaviour, problem-solving and have "impaired cognitive flexibility" (Schachar et al., 2000, cited in Parsons, T. D., Bowerly, T., Buckwalter, J. G. and Rizzo, A. A., 2007, p.3).

As part of this unit, my coursemates and I took part in NeuroLab exercises to conduct short experiments for different components of neuropsychology. As for attention, we conducted a few experiments, some of which I found very intriguing. For example, one of the experiments required for 3 of us to memorise a list of 20 words each in 3 minutes, but we each had different conditions to memorise the words under. I had to memorise the words by solely focusing on the task,

and so I stood outside the lecture room away from any noise and all distractions, whereas the two other members had dual tasks whereby they had to do something whilst also trying to learn the words. One had to learn the words whilst repeating 'dinosaurs are rare' out loud and the other had to count backwards from 400 in fours out loud as well as memorising the words. The results showed that I memorised the most words compared to the other two due to only focusing on one stimulus of learning. This experiment helped portray just how difficult it is for students with ADHD to study as they often have two or more stimuli of learning occurring at once. We also took part in a test called the Rey–Osterrieth complex figure which is a neuropsychological test that looks into attention and memory (Duley, Wilkins, Hamby, Hopkins, Burwell & Barry, 1993). Here we had to memorise a complex image that consisted of different shapes and lines and then had to recall the image and copy it as best as we could remember to the actual image.

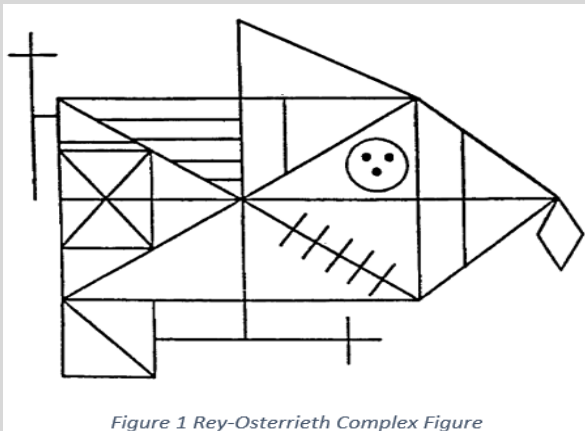


Figure 1 Rey–Osterrieth Complex Figure

Solutions to ADHD in schools

Alongside medication, there are a variety of interventions that take place to help support ADHD students and two that have been proved to be effective is behavioural parent-training programs and classroom-based behavioural interventions (Pelham et al, 1998, as cited in Pisecco, Huzinec & Curtis, 2001). Classroom interventions are said to be very important in treating ADHD and to also address the poor academic attainment of ADHD students (DuPaul & Eckert, 1998). Pisecco, Huzinec & Curtis (2001) argue that the outcome of the treatment is dependent on both the teacher and child, the teacher has to show a willingness to want to participate in the process of treatment for the classroom-based behavioural programs to be successful. An example of a classroom intervention is classwide peer tutoring (CWPT). This is when two students, a high achieving student and a low achieving student work together on academic tasks and one assists the other on the task. Studies have shown that this is a very effective method for improving the academic performance of ADHD students, also it is an intervention that requires little training from the teacher and can be implemented on a classwide basis, meaning that everyone, as well as ADHD students, can benefit from it (DuPaul & Eckert, 1998).

As stated earlier on the experiments from the NeuroLab, it can be seen that ADHD students with their short attention spans, would require to be taught slightly differently than other students for them to fully grasp what is being taught. For example, the duration of tasks should be taken

into consideration, children with a short attention span should be taught information gradually, starting with the key information first. In terms of memory, it is advised to start small by teaching them recall words first and then phrases and then whole sentences (Jensen, 2013).

Students with ADHD require time and support and teaching such students may require persistence, however, if the right interventions are put in place with teachers who are enthusiastic to help, then their academic ability will improve as well as being able to treat their ADHD.

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