

How to adjust your contents to people with ADHD

There are two main kinds of attention deficit hyperactivity disorder (ADHD):

1. Attention difficulties-

In this case, information processing is slow, leading to failure in adequate comprehension. It is difficult to hold one's attention for a long time, as the brain is overwhelmed by too much information coming in at once.

2. Low concentration range-

When the ability to focus attention resources to a given situation is impaired, the auditory channel is less effective and therefore information that only passes in writing or speaking gets lost more often.

Since many schools' teaching methods do not accommodate to students with ADHD, those students experience trouble in achieving the results they can potentially achieve with the right methods, causing them to grow up with lowered self-esteem. This process begins in at the end of elementary school and leads to them giving up in advance – a "why should I even try?" approach.

For the most part, the students are very intelligent and there is a big gap between their intellectual level and their academic achievements. That means any material which is intended to be taught to students with ADHD should be at a relatively high level so that they don't get bored, but it should also be tangible, concrete, and clear.

There are three main processes involved in learning:

1. Absorption of the studied material
2. Processing
3. Retrieval

However, there are additional difficulties to these processes. For example, during the "processing" stage, memorization of the material creates effective learning whether it is done consciously or not. Having a damaged short-term memory causes information to be lost relatively quickly.

Students can have trouble in retrieval as well, not knowing how to retrieve the correct word or answer from their memory. For example, a child with a learning disability will think much more about the question than the answer. It takes them time to process the information they have taken in, and only then can they think of an answer.

So now when we understand the subject a little bit better, what can we improve to include these children and teenagers?

1. To compensate for the damage to the auditory channel, add a lot of tangible explanations, such as pictures or physical objects they can touch, and not only words.

We have made a 3D DNA puzzle, to convey the topic of DNA structure in a tangible and fun way – children can assemble and disassemble DNA by themselves to learn what nucleotides are and how they connect.

The puzzle design is attached, and anyone can print the model in a 3D printer. Use the model as a visual aid and teach lessons that are significant even for students with ADHD.

2. Up to the age of 11, children think in a way that is very concrete and less symbolic and abstract. In this age, there is a difficulty in generalization, and metaphors might not be understood. It will be best to stick to things children know and correspond with.

3. To maintain their continuous attention during a lesson, you should consider prize bearing games. Give the children incentives that would keep them focused. You should build the difficulty level in an increasing manner.

4. Another helpful way to handle these issues is positive reinforcements. It is crucial since children sometimes lack the self-voice that encourages and comforts them. It is important say comments such as "Nice Work" when they succeeded, but also "It sucks it didn't go well, but try again, you'll surely succeed!" or "the effort is what matters" when they don't.

5. Another recommendation is to give concrete certificates of excellence. This means defining their success in achievable goals such as: "you studied 5 lessons, great job!", and not only "great job!".

6. While conveying information try to keep the children active, as interactive teaching is beneficial for them. For example, make a game that accompanies your lesson. Our group made an Escape room, which generates action and tension and therefore generates interest and external stimulation. Our escape room is translated to 4 languages: Hebrew, Arabic, Russian and English, and you are most welcome to teach it yourself if you would like to. The game is available here: <https://roomscapemaker.com/u/iGEMTechnion/iGEM>

7. While teaching new information, remember knowledge is not always completely preserved, so try to find a way to reproduce and recycle. One of the interesting ways to do so is to play a game that summarizes the material at the end of each study unit. An example for such game can be a crosswords puzzle, providing the word list to make the game easier.

8. If you make educational videos - avoid music to allow for them to focus their attention on the visual content. Animated videos are recommended.

Try to use one main character and make it intriguing, but not scary. If you make several videos, having a fixed pattern in the videos is beneficial. Try to make surprising moments to attract attention, it prevents them from losing focus.

In addition, a relatively significant percentage of the kids with ADHD experience a level of anxiety. Therefore, avoid doing things that can cause anxiety.

Visual aids are highly recommended; add photos to maintain their attention. Another way to keep a lesson interactive is to ask them questions, if possible, so they can answer and participate. They can also answer by commenting on the video and the answer to the question will be given later on.

Best of luck!

Angel Roots, iGEM Technion 2022.

