Communicating a scientific concept to a special-needs learner

Learning Disability

The disability that I am addressing is attention deficit hyperactivity disorder, otherwise known as ADHD. According to the Center for Disease Control and Prevention, ADHD is a common neurodevelopmental disorder that is typically diagnosed in children. While many ADHD diagnoses occur during childhood, ADHD is also diagnosed in teens and adults later in life. Many women go undiagnosed with ADHD until they reach adulthood, since the majority of research and literature regarding ADHD is centered around the experience and symptoms of young boys (Slobodan and Davidovich 2019).

ADHD is categorized into three different types: inattentive, hyperactive, and combined. Inattentive symptoms include difficulty organizing and finishing tasks as well as paying attention. Hyperactive symptoms involve fidgeting, interrupting, and impulsivity. The combined type displays symptoms from both the inattentive and hyperactive types of ADHD (Center for Disease Control and Prevention 2021). Due to these symptoms, individuals with ADHD may benefit from attention grabbing and student-centered learning tactics that place students as the drivers of their own learning.

Scientific Concept

The scientific concept that I would like to communicate revolves around deep sea exploration. While there are several research vessels that routinely conduct deep sea exploration, only about 5% of the ocean has been explored and mapped. Deep sea research vessels like the EV Nautilus utilize remotely operated vehicles (ROVs), which are unmanned machines tethered to a boat that can be maneuvered underwater at great depths. These machines are generally the size of a small car and can withstand pressures up to 6000 meters deep. ROVs are used as tools

for biological and geological data collection and sampling. The submersible ROVs receive power from the surface through a fiber-optic cable and transmit video to the operator on the vessel, lit by LED lights. The operator can manipulate arms on the machine from the operating room and collect samples to bring to the surface. ROVs have contributed to the discovery of new deep-sea species, the investigation of ecosystems like hydrothermal vents, and the exploration of marine archeological sites.

Using mainstream approaches may be difficult when teaching deep sea exploration to individuals with ADHD. Typical approaches for learning about deep sea exploration involve videos, graphics, and data-driven activities. These types of strategies may not be effective for individuals with ADHD, as they tend to learn best in engaging situations that allow them to drive their own learning. A hands-on strategy that focuses on the individual's experience would aid in facilitating learning.

Learning Strategy and Methods

In order to overcome the limitations of individuals with ADHD, I propose a hands-on interactive exhibit. My exhibit will literally put the student in the driver's seat of their own learning. Engaging content will surround the student, so that it will be more difficult to slip into inattentiveness. The science of deep-sea exploration will be communicated through the viewpoint of an ROV operator and allow the student to visualize themselves as a researcher.

The exhibit will consist of a room that is a model of the ROV operating room on a deep-sea research vessel. Upon entering the exhibit, the student will sit in front of screens that display underwater video from previous research cruises. Using a virtual reality approach, the student will be able to "drive" the ROV and explore different deep-sea ecosystems, such as hydrothermal vents, coral habitats, volcanoes, and archaeological sites. The student can also take samples,

examine sensor data (such as temperature and salinity), and inspect underwater mapping data. This approach will be similar to a video game, except the student will be exposed to real data and a scientific approach to marine science.

This video game like strategy is appropriate for individuals with ADHD, as it directly combats symptoms of all types of ADHD, such as inattentiveness and hyperactivity. There will be no lack of visually stimulating screens, buttons, and data to engage the student. Additionally, the virtual reality driving of the ROV and guidance of the mechanical arms will keep the student's hands physically busy. This aspect will address the fidgeting and impulsivity symptoms of hyperactive ADHD by allowing them to use their hands to explore the undersea world.

Finally, this exhibit will address the issue that many students in this generation cannot imagine themselves as a scientist. Students with ADHD may face learning challenges that lead them to believe that they are not capable of becoming a scientist. By putting the student in the role of a scientist and allowing them to visualize themselves as a scientist, they may become empowered to engage in science in the future.

Reflection

Studying the learning behavior of a special-needs learner has helped me expand upon the strategies I use to teach students and the general public. It is apparent that not all activities, museum exhibits, and learning strategies are sufficient to promote the education of special-needs learners. While other disabilities can be addressed more clearly, neurodevelopmental disorders like ADHD can often go ignored when designing educational content for students since ADHD is not always visible. It is crucial to consider how learning strategies can affect different types of learners so that our educational system can be fairer to all types of students.

References

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