IN THE ZONE For Learning

A program to assist students with complex learning needs

A BOTTOM UP AND INSIDE OUT APPROACH

Are my students IN THE ZONE for learning?

INFORMATION BOOKLET
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Introduction
The purpose of this information booklet is to summarise some of the key concepts contained within the on-line tutorials. It has been written for teachers.

We would recommend you listen to the online tutorials and read this information booklet before using the profiling tool and strategy section that is available on the website.

How does a student process information?
Students are presented with a large amount of information across a number of different subject areas. They take in this information through their senses. Their senses organise and interpret this information. They then respond to this information with an action. This ability to organise, interpret information and then respond with an action is called Sensory Processing.

It involves the following stages:
1. Sensory input
   Example – Teacher gives instructions
2. Tuning into sensory input
   Example – Listen to the voice, look at teacher
3. Sensory processing
   Example – Interpret the sounds and images
4. Motor reaction
   Example – Follow instructions
There are 7 sensory systems that take in information from the environment and send our brain different messages:

1. Auditory (sound)
2. Visual (sight)
3. Gustatory (taste)
4. Olfactory (smell)
5. Tactile (touch)
6. Vestibular (movement processed in the inner ear)
7. Proprioception (body position processed in the muscles, tendons, joints, and skin)

Each of these seven sensory systems have two functions:

- To protect you from danger such as pulling your hand away from a hot plate or blocking your ears from a loud sound. This is a reflexive and unconscious response which is linked to the limbic emotional system and protective fright/flight/fight system of the brain.
- To discriminate the sensory input in terms of its quality and function, e.g., soft, smooth or loud, sour etc. Discrimination is a conscious, cognitive task which is learned through experience.

Some students experience challenges in one or both of these sensory functions within one or multiple sensory systems.
The neurobiology of sensory processing

Sensory input from our senses sends electrical impulses or neurons from where we received the information to the Central Nervous System in the brain. This information is then organised in the brain, a process known as sensory processing or sensory integration, and then an appropriate motor or behaviour response is generated (Ayres, 1972). Mostly, the information received is integrated together to form patterns within the brain stem (Arwood & Kaulitz, 2007). These patterns form networks, which transport information to higher parts of the brain where sensory integration and the development of concepts take place (Arwood & Kaulitz, 2007). Before concepts can be learnt at the cortex level, sensory processing/integration must be achieved.

Synapse

The space between a message neuron and a receiving neuron in the brain is called a synapse, which involves a complex exchange and release of chemicals (Northern Territory Dept. of Health & Community Services, 2006). These chemicals transmit the impulse from the message (excitatory neurotransmitters) and others help reduce the impulse from strong messages (inhibitory neurotransmitters) (Northern Territory Dept. of Health & Community Services, 2006). A typical central nervous system has a stable chemical exchange which allows the student to focus on important sensory inputs while simultaneously ignoring unimportant sensory inputs (Northern Territory Dept. of Health & Community Services, 2006).

Tuning into sensory input

When sensory information is noticed by one of our seven senses, there is a moment when we choose to tune ourselves into this message. Some students who have difficulty noticing sensory inputs are unable to tune into the message and are therefore unable to process the information appropriately. This can cause Sensory Processing Difficulties.
Sensory Processing Difficulties

Difficulties can occur when our Central Nervous System does not process sensory information appropriately (Northern Territory Dept. of Health & Community Services, 2006). This occurs when there is an imbalance in the chemicals within the synapse and the ability to focus on important messages and ignore weak messages is impaired. For example a student may be unable to reduce sensory input due to an imbalance of too many excitatory transmitters, causing over-sensitivity (Northern Territory Dept. of Health & Community Services, 2006). In addition, a student may be unable to increase the sensitivity of a message, having too many inhibitory transmitters, causing under-sensitivity. A student who is over-sensitive may respond to the received information through sensory sensitivity or sensory avoidance (Northern Territory Dept. of Health & Community Services, 2006). A student who is under-sensitive may cope with received information through sensory seeking or sensory registration (Northern Territory Dept. of Health & Community Services, 2006).

Over-Sensitivity

This occurs when a student cannot ignore unimportant information and too much information is processed = hypersensitivity. This student will register sensory information too intensely, which can often cause negative reactions, as the student can feel irritated or threatened (Northern Territory Dept. of Health & Community Services, 2006).

Some features of a student who is over-sensitive and sensory defensive (sensitive and avoiding)

- May have difficulty blocking out incoming information and staying on task (Northern Territory Dept. of Health & Community Services, 2006).
- May misinterpret a casual touch as an attack.
- May respond to unfamiliar situations by lashing out or shutting down.
- Actively engages in reducing sensory information received.
- May be distressed by changes in routine, loud noises & crowds (Dunn, 2002).
- May appear to have low energy and be lethargic.
- May avoid touch and movement exercises as they are unable to tolerate them.
- This student is similar to the Rabbit character from Winnie the Pooh.

Under-Sensitivity

When a student does not receive enough information, as some sensory messages are not strong enough = hyposensitivity. This student will respond less intensely to sensory stimuli. The student may miss simple cues, may respond to instructions slowly or misinterpret verbal or nonverbal cues (Northern Territory Dept. of Health & Community Services, 2006).

Some features of a student who is under-sensitive:

- This student has ‘dulled’ registration of sensory input and does not actively engage in the environment (Northern Territory Dept. of Health & Community Services, 2006).
- May lack initiative, fatigue easily, appear lethargic and be difficult to engage.
- May knock into and bump into things due to reduced sensory feedback.
- This student is similar to the Eeyore character from Winnie the Pooh.

Sensory Seeking and craving

- Actively pursues sensory input.
- May be attempting to achieve an optimal state by either increasing or decreasing alertness levels.
- Student may be very active, fidgety and excitable (Williams & Shellenberger, 2001).
- May require additional stimulation to meet their sensory needs.
- This student is similar to the Tigger character from Winnie the Pooh.
Senses and Learning
Sensory Processing Difficulties (SPD) can affect how a student learns at school as their ability to register information, filter out unimportant information and focus on important information can affect a student’s ability to reach an optimum state of alertness (Northern Territory Dept. of Health & Community Services, 2006). In addition, students with SPD are unable to effectively recognise patterns and turn them into concepts. This can cause repetitive behaviours and limited language symbols as the student’s learning system is not integrating the sensory information it receives (Arwood & Kaulitz, 2007).

Sensory diets assist the student to remain in the zone for learning
A constant supply of sensory information assists the human body to function and remain in the zone for learning. The term ‘Sensory Diet’ (coined by an American Occupational Therapist Patricia Wilbarger) refers to the amount of sensory-motor activity and sensory information an individual requires in order for them to be at a optimum level of alertness – in the zone for learning (Northern Territory Dept. of Health & Community Services, 2006). Typically, individuals provide their own sensory diet by listening to slow music to calm down or re-positioning in their chair to keep alert. Students with SPD have difficulties with this, as they are not able to provide themselves with the correct levels or types of sensory input in order for them to remain in the zone for learning.

Self-regulation and co-regulation of alertness levels
Students need to regulate their own state of alertness during a typical school day, for example as they move from quiet work, to play time at lunch, and then back to quiet work in the library. Self-regulation is the ability to attain, maintain and change levels of alertness appropriately for a task or situation (Northern Territory Dept. of Health & Community Services, 2006). Some students are able to self-regulate themselves during a school day. Some students require others to help them to regulate their level of alertness to match the demands of the situation. This is referred to as co-regulation.

How to use this information
Once you are familiar with these key concepts and those within the online tutorials. We would recommend using the profiling tool and strategy section. The profiling and strategy section has been developed as a tool for teachers and is to be used as a general guide ONLY. Please consult an occupational therapist specialising in sensory processing disorders for assessment and interventions for individual students with complex needs.

REFERENCES:


