



The National PTA estimates that vision problems affect the ability to learn for over 10 million students. Diminished visual ability is problematic since over 70% of what we learn is delivered via our visual processing system. The visual system's job is to reconstruct a three-dimensional world from the information taken in through the eyes and understood through the parts of our nervous system devoted to visual processing.

The visual cortex is the most massive system in the human brain and is responsible for higher-level processing of the visual image. To perceive something visually requires that the pattern stands out enough from the background noise of all the other information coming into the system. When we "see" something, the brain looks for a reference to an existing network to which the visual image fits. If it is a good fit, then it is recognized and can become learned and related to other information stored in the brain.

It is important to understand that information is not stored in a specific location in the brain but in various places through the visual, auditory, and motor cortices, which are connected in neuronal networks. Thus, the ability to perceive and learn is affected by the strength of those other sensory systems as well as the connections among them.

Researchers do not always agree on the dividing line between vision and cognition. While there may be some areas of vision development that are isolated from cognition (that is, they don't rely on contextually derived expectations), deriving meaningful information from visual data almost certainly relies on cognition.

Vision is not just 20/20 eye sight. There are many other areas that affect our ability to process information. Examples include.

- Seeing the board -- distance vision.
- Seeing words in a book – near vision.
- Ability to maintain clear vision while shifting focus from a distant object to a near one -- focusing ability.
- Being able to aim both eyes accurately and move smoothly across the line of print – visual tracking eye movements.
- Accurately aiming you eyes at words in a book – saccadic eye movement
- Being able to use the eyes to guide the hands – eye-hand coordination.
- Being able to coordinate the two eyes together so that they are precisely directed at the same object at the same time -- eye teaming.
- Maintaining, for long periods of time, completely clear vision while looking at near or distant objects -- eye focusing.
- Ability to interpret and project the concepts of "left" and "right" into space and onto other objects – directionality/laterality
- Ability to perceive visual information in a consistent form regardless of distance, location or orientation -- form perception
- Concentrating for an amount of time on a single activity -- attention span.
- Ability to recall an image that has been seen, mentally manipulate it and change aspects of it in the mind – visualization.



Perceptual abilities such as directionality, attention, and visualization are cognitive skills that require various mental processing skills to work together. In fact, the basis of cognition is the brain's ability to synchronize all the electrical activity it is constantly receiving and generating.

The visual system does not work alone and optometric vision therapy can be most effective when it incorporates cognitive skills development in the systems most integrated with the visual system, including attention, memory, and even auditory processing. If there is a problem and a child's information system begins to break down, therapy focusing on a single area will take longer to succeed than therapy that addresses the skills in the integrated manner they operate in the brain. In general, a cognitive skills training program that draws upon visual processing and sequential processing skills will increase visual processing skills which could increase the ability to respond to vision therapy delivered in a clinic.

It is also true that basic vision processes such as focusing and tracking eye movements are prerequisites to the ability to take information into the visual system for higher-level processing. Thus, cognitive skills therapy may also be an appropriate follow-on to vision therapy.

In summary, including cognitive skills therapy in an optometric vision therapy program should lead to improved results from the vision therapy program itself and better outcomes in terms learning performance for the individual child.

Sources:

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