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Training in Effective use of Vision in Students with Low Vision

Abstract

Vision is the primary sensory input. About 80% of learning takes place through the visual system (State-wide Vision Resource Centre). Vision is responsible for seeing the world and is also the unifying sense allowing sighted people to integrate their sensory experiences. At three months of age vision is the lead sensory modality and at six months it is the primary source of information about the environment. A huge number of children with visual impairment have some degree of residual vision. The amount of residual vision varies greatly among individuals. It is very important to encourage the person with low vision to use his/her residual vision at maximum level. Functional Vision refers to the way in which the person uses whatever vision he or she has. Systematic training will enhance the functional vision of individuals with low vision.

Keywords: *Functional Vision, Students with Visual Impairment, Visual Impairment*

Introduction

Vision is a cognitive act which enables us to look at an object and not only identify it but to determine where it is, its size and distance from the observer, its rate of movement its texture and everything else that can be determined by visual inspection. Eyesight which involves the sensory ability of the eye to distinguish small details is only one component of vision (Gibson, 1950).

Visual impairment refers to a significant loss of vision in both eyes, which cannot be corrected with glasses. Based on the degree of loss of vision, visual impairment is classified into two types.

1. Blindness means a condition where a person has any one of the following conditions, after best correction
   - total absence of sight; or
   - visual acuity less than 3/60 or less than 10/200 (Snellen) in the better eye with best possible correction; or
   - limitation of the field of vision subtending an angle of less than 10 degree. (RPWD Act, 2016).
2. Low-vision means a condition where a person has any one of the following conditions, namely:
   - visual acuity not exceeding 6/18 or less than 20/60 upto 3/60 or upto 10/200 (Snellen) in the better eye with best possible corrections; or
   - limitation of the field of vision subtending an angle of less than 40 degree up to 10 degree. (RPWD Act, 2016).

Approximately 90% of the visually impaired population live in developing countries or low-income circumstances, and about 80% of all visual impairment worldwide can be prevented, treated, or cured with proper access to eye care (NCBI). According to World Health Organization report globally in the year 2017, there is an estimated a population of 253 million people live with vision impairment: 36 million are blind and 217 million have moderate to severe vision impairment. 81% of people who are blind or have moderate or severe vision impairment are aged 50 years and above. Globally, chronic eye diseases are the main cause of vision loss. Uncorrected refractive errors and then

un-operated cataract are the top two causes of vision impairment. Un-operated cataract remains the leading cause of blindness in low and middle income countries. The prevalence of infectious eye diseases, such as trachoma and onchocerciasis have reduced significantly over the last 25 years. Over 80% of all vision impairment can be prevented or cured.

Explanation of Various Terms Related to Visual Impairment

- Visual Acuity refers to the ability to discriminate high contrast, fine details at distance, the sharpness and clarity of vision.
- Visual field means the total area seen when looking straight ahead without moving the eyes or head.
- Visual Functioning refers to ability of a person to use vision for all activities.
- Loss of visual acuity leads to an inability of the person to see objects as clearly as a healthy person
- Loss of visual field leads to inability of an individual to see as wide an area as the average person without moving the eyes or turning the head (Mandalet al, 2013).

Characteristics of Students with Low Vision

1. All people with low vision have residual vision.
2. For Individuals with low vision print materials should be magnified, contrast enhanced, or type of font or size changed (Turnbull et al., 2002).
3. Individuals with low vision find difficulty in seeing details in any kind of pictures because of colour, contrast and brightness. Students in this category characteristically work more slowly and have difficulty in working with details (Barraga et al., 1992).
4. Adaptations may vary from one individual to another individual.
5. Many individuals with low vision can use normal print for reading and learning. But some students need optical devices and non-optical devices to read and write.
6. Some students can move independently in the environment but for a few students, it is very difficult to move around.
7. Most of the individuals with low vision face difficulty in reading and copying from blackboard. In this regard students are benefitting with the help of optical devices.
8. Students with Low Vision have some amount of vision that can be used for execution of certain tasks.

Common Causes of Visual Impairment

Based on the onset of visual impairment, it is divided into two categories that is congenital vision loss which occurs during birth and adventitious vision loss that occurs later in life as a result of a degenerative condition, illness or accident.

Macular Degeneration

A degenerative condition affects the central part of the retina that is the macula and resulting in distortion or loss of central vision.

Diabetic Retinopathy

It is a diabetes complication that affects eyes. It is caused by damage to the blood vessels of the light-sensitive tissue at the back of the eye i.e. retina.

Retinitis Pigmentosa

It is a genetic disorder of the eyes that causes loss of vision. Symptoms include difficulty in seeing at night and decreased peripheral vision (side vision).

Amblyopia

The visual system fails to develop normally during childhood. The blur vision is the result of Amblyopia either in one eye or in both the eyes.

Retinopathy of Prematurity (ROP):

It is an eye disease that can happen in premature babies. It causes abnormal blood vessels to grow in the retina, and can lead to blindness.

Retinal Detachment

It is a disorder of the eye in which the retina separates from the layer underneath. It leads to total vision loss.

Cataract

It is the clouding of the eye's natural lens. Due to clouding in lens light cannot reach the retina at the back of the eye which leads to loss of vision.

Glaucoma

It is a condition that damages eye's optic nerve. It occurs due to increase of internal pressure in the eye because of drainage of fluid within the eye. It leads to peripheral vision loss and difficulty in night vision.

Functional Vision and Assessment

Functional vision refers to the way in which an individual uses whatever vision he or she has. Functional vision has been defined as vision that can be used to perform day to day activities (Gothwal et al., 2003). Functional vision means how the eyes and the visual system functions and how the person functions in vision-related activities (Colenbrander, 2010). It is the ability of a person to use their remaining vision effectively. The amount of functional vision varies greatly among individuals. Common requirement of students with low vision is instruction to use their vision efficiently. For a student with a field loss, it might be viewing print eccentrically to maximize clear perception of the print. For another student it might be paying attention to objects in their peripheral field when walking to get as much advance warning of impending obstacles as is possible. In either case, the remaining vision that is present in the defective eye and that allows any sight possible is called as functional vision. Functional vision is the way in which an individual uses whatever vision he or she has for doing any kind of task.

Persons with visual impairment can learn to make better use of their residual vision and we need to encourage them to do so. Functional vision depends on a person's experiences and training and can vary with different conditions. Any remaining sight, no matter how little, by using that vision can add to his/her experience, enjoyment and learning about the world.

Functional vision assessment is a crucial skill those who are handling students with visual impairment because it helps them to predict and plan for appropriate intervention for learners with low vision (Jose, 1985).

The purpose of assessment of functional vision is to determine the current level of visual functioning which can be used for educational tasks, independent mobility, social contact and independent living skills. The functional vision assessment includes a variety of evaluation that test the child's use of residual vision in daily activities. Following items are involved in functional vision assessment.

1. **Near and Distance Acuity:** An acuity measurement is taken at near range using a near vision acuity chart. This measurement is often recorded in print size. Distance visual acuity is typically measured at a distance of feet or meter. A distance tasks may include the distance at which the child can see print on the white board, chart and seeing hand from the

distance. The assessment report should include examples of environmental features such as faces, signs and travel cues the child can see and what distance the child can see each feature.

2. **Peripheral Visual Field:** Peripheral vision is the ability to see movement or objects outside of the immediate line of vision. Field loss is measured in degrees.
3. **Reading Level and Speeds:** An informal reading inventory indicates the grade level at which a child is reading as well as how fast she/he is reading in comparison to her/his peers.
4. **Current Print Functioning:** The functional vision assessment should state the child's primary mode of reading, whether it is regular print, large print, optical devices or Braille.
5. **Light Sensitivity:** Light sensitivity has implications for how the student performs in a variety of illuminated settings. Children with diagnoses such as albinism or achormatopsia are significantly affected by higher levels of illumination and often perform tasks better under less illumination. There are also visual conditions for which additional lighting is necessary. For a majority of visual conditions, glare will adversely affect visual functioning.
6. **Colour Perception**: Colour perception is the ability to perceive differences in colour.
7. **Convergence**: Convergence is the necessary inward movement of the eyes in order to focus on a near object.
8. **Eye Movements:** Eye movements of student refer to the ability to track a moving object in vertical, horizontal, oblique and circular directions.
9. **Eye Preference**: Eye preference is a term used to describe the eye a person prefers to use for accessing his/her visual environment.
10. **Muscle Balance**: Muscle balance is a term used to describe the alignment of the eyes and how they move together. Proper alignment is needed for the eyes to work together and proper muscle balance is essential for the ability to converge.
11. **Binocular Vision**: Binocular vision is a person's ability to perceive three dimensional depth by fusing the images of each eye.
12. **Depth Perception:** Differentiate an object's solidity and its position in space related to other object is called as depth perception.

Training to enhance Functional Vision

Functional vision training helps the person in day today activities. Even slight vision can be useful to the person. Systematic training will enhance the functional vision of individuals with low vision.

Vision Stimulation is the most important aspect in the training of use of vision. Vision stimulation means helping a person to develop maximal use of his/her residual vision. The children who have very little vision, or those who have not used it, need to know that they can use their vision. It may mean teaching a low vision person to use visual mode of learning instead of tactual mode. Vision stimulation enhances the level of visual awareness and efficiency. The aim of vision stimulation training is to provide appropriate visual stimulation activities in a particular order and sequence, which will help the person to use his limited visual ability to the best. Since the persons with low vision may have very limited experience in looking at things visually, learning to use one's vision may initially be a tiring experience or an unpleasant activity for most. So the selection of visual stimulation activities should be appropriate, attractive, interesting, motivating and enjoyable. It is also important to know that eyes do not get damaged by using vision or holding things close to the eyes.

The extent to which vision is used is called visual functioning. Visual functioning

skills allow people with visual impairment to gather information from their experiences, which they use to interpret their immediate surroundings and to apply in other circumstances. According to Corn (1989), visual functioning skills help students gain information from directed, as well as incidental, experiences and aid them in planning and carrying out tasks.

Importance of functional vision assessment

1. It helps to determine the current visual functioning level of the person.
2. It helps to determine the extent of visual stimulation and instruction needed to help the person make optimum use of the remaining vision.
3. It enables the person to use his limited vision to the highest potential.
4. It helps to plan the person's mobility training programme.
5. It helps in decisions regarding the use of visual stimulation materials.
6. It helps to decide upon the nature of the primary reading medium.
7. It enables one to decide on the type of devices needed by the person.

Functional Vision Training Activities

The functional vision training activities are helpful to students with low vision between the age group of 8-18 years of old to use their residual vision at maximum level (Gothwal et al, 2003).

Fifteen activities are given below to improve the residual vision of students with low vision.

1 **Visual Awareness:** It refers to the ability of the child to identify the objects present in the visual field. Example: Asking the child to identify the object which is present in front of the eyes of the child.

2 **Visual Attention**: It refers to the ability of the child to attend the objects with sound in front of the child. Example: Getting attention from the child using rattle ball.

3 **Visual Fixation:** The ability of the child to fix the eyes on the moving object. Example: Asking the child to fix eye sight on particular object.

4 **Visual Focus:** The ability of the child to focus the object at various distances. Example: Asking the child to focus the object present at various distances (1 m to 3 m distance).

5 **Visual Fusion:** The ability of the child to see the two dissimilar objects as one. Example: Asking the child to use his eyes to see only one object.

6 **Visual Tracking:** This refers to the child's ability to follow a moving object with his eyes. Example: Asking the child to track the object with eyes. It means if teacher is rolling the ball on the floor, the student should follow that moving object.

7 **Visual Scanning:** This refers to the child's ability to search for a particular object among other objects. Example: Asking the child to pick one object among other objects.

8 **Visual Discrimination:** This refers to the child's ability to distinguish different objects on the basis of their colour, shape or size. Example: Asking the child to differentiate the shapes among other shapes.

9 **Visual Figure Ground Discrimination:** This refers to the child's ability to isolate a particular object or a picture from the background. Example: The child is given a picture and asked to circle a particular part in the picture.

10 **Visual Memory:** This refers to the child's ability to store and recall the past experiences and integrates them with new ones or ability of the child to recall the objects which is seen before ten minutes. Example: The child is asked to recall the object which is seen earlier.

11 **Visual Closure:** This refers to the child's ability to perceive a total picture or object when a part is visible/available. Exam-

ple: Recognize the picture while part of the picture is missing.

12 **Visual Spatial Relations:** This refers to the child's ability to identify spatial concepts like directions, distance etc. Example: Ask the child to show the pictures which are present in right, left, up, down directions of the particular picture.

13 **Eye Hand Coordination:** The ability to perform a task using our hands and eyes in coordination is referred as eye-hand coordination. Example: Asking the child to trace the lines using finger on the line in a given picture.

14 **Eye Foot Coordination:** This refers to the child's ability to perform a task using eyes and foot in harmony. Example: Asking the child to step on the circle markings drawn on the floor.

15 **Form Constancy:** This refers to the child's ability to perceive the same object at different positions. Example: Ask the child to identify a picture showing an object in different positions.

Conclusion

Functional vision training is full of vision related activities. Through these activities functional vision can be developed among the students with Low Vision by improving the residual vision. So, due importance should be given to improve the functional vision of students with low vision to read, to write in academic and to do daily tasks independently.

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