chapter 17

Disability Studies in Inclusive Education

The nature of visual impairment and its impact on learning

Kofi Nseibo

Chapter learning outcomes

After completing this chapter, you will be able to:

- Understand the nature of visual impairment.
- Describe eye conditions that lead to visual impairment and how these present.
- Examine the effect of low vision or blindness on children in the classroom.
- Identify barriers to learning experienced by learners who are blind or have low vision.
- Explain the importance of human rights and legal issues for learners who are blind or have low vision.

Preparatory activities

READ: Developing the best education for your child with blindness or visual impairment

Author: Perkins School for the Blind
Year: 2016
Estimated reading time: 1 hour
File size: 8.7 MB

READ: The value of the orientation and mobility profession in the lives of learners and teachers

Author: Ann Heard
Year: 2020
Estimated reading time: 1 hour
File size: 8.2 MB

ACTIVITY

Estimated time: 25 minutes

1. In your own words, explain your understanding of the nature of visual impairment.
2. How would you classify visual impairment in relation to visual acuity?
3. List at least 10 ways in which you can identify a learner with visual impairment in your inclusive classroom.

Introduction

> "Your success and happiness lies in you. Resolve to keep happy, and your joy and you shall form an invincible host against difficulties." – Helen Keller

It is estimated that at least 2.2 billion people around the world have a vision impairment, of whom at least 1 billion have a vision impairment that could have been prevented or is yet to be addressed (**World Health Organization [WHO], 2019**). In South Africa, there is no current evidence of the prevalence of vision loss in the general population and its associated factors (**Addo et al., 2021**). The only available data about the prevalence of vision impairment in South Africa was the 2011 population census which estimated a disabled population of 7.5% (**Addo et al., 2021**). The census describes disabilities in levels of difficulty across six proficiency areas: seeing, hearing, communicating, remembering, or concentrating, walking and self-care. According to this data, about 1.7% of South Africans (approximately 1 million people) experience severe visual difficulty.

South Africa currently has 22 special schools for the blind across the country, but the report by Fish-Hodgson and Khumalo (**2015**) revealed that these schools have inadequate resources and the standard of education offered to visually impaired learners is low. As a result, entrance into tertiary education is low (**Botha, 2021**).

In this chapter, we discuss the nature of visual impairment, important eye conditions that lead to it and how these present. We also examine the effects of low vision or blindness on visually impaired children in the classroom. We then identify barriers to learning experienced by learners who are blind or have low vision. Finally, we will look at the importance of human rights and legal issues for learners who are blind or have low vision and how their rights can be promoted.

The nature of visual impairment

In this section, we will unpack the nature of visual impairment in terms of the definition, classification, and the anatomy of the human eye. Visual impairment, also known as vision impairment or vision loss, is a decreased ability to see to a degree that causes problems not fixable by usual means, such as glasses. Visual impairment is also described as visual acuity ranging between 20/70 and 20/400 or having a visual field of 20 degrees or less. Some definitions include those who have a decreased ability to see because they do not have access to glasses or contact lenses. The term "blindness" is used for complete or nearly complete vision loss. Visual impairment may cause people difficulties with normal daily activities such as reading, socialising and walking (**WHO, 2023**).

Clinical testing of visual impairment

In the clinical measurement of visual impairment, both feet and metres can be used, depending on the country. When 20/20 is used as the recorded visual acuity (central vision), it means that the distance from a person to an object is measured in feet. The 6/6 indication is used when recording clinical visual acuity in metres. This means that 6/6 (used in countries that have the metric system) implies the same measurement as 20/20 (used in countries such as the US and other countries still using the imperial system).

In the next section, we discuss the anatomy of the human eye in relation to visual impairment.

Classification of visual impairment

The WHO (**2023**) uses the following classification of visual impairment, which maps visual acuity to a proportionate score as a means of identifying levels of visual acuity.

A child's experience of visual impairment varies and is dependent on many different factors. This includes, for example, the availability of prevention and treatment interventions, access to vision rehabilitation (including assistive products such as glasses or white canes), and whether the child experiences problems with inaccessible buildings, transport and learning materials. Visual impairment changes how a child understands and functions in the world and it can affect a child's cognitive, emotional, neurological and physical development by limiting the range of experiences and the kinds of information a child is exposed to (**McDowell, 2020**). Knowledge about the classification of visual impairment will help you to understand how a child with visual impairment learns and what accommodation and adaptations such a child will need (see **Chapter 18**). The WHO (**2019**) further gives classification according to clinical testing of vision (see Table 1).

Table 1: WHO clinical classification of vision loss

Type of vision impairment	Severity	Description
Distance vision impairment	Mild	Presenting with visual acuity worse than 6/12
	Moderate	Presenting with visual acuity worse than 6/18
	Severe	Presenting with visual acuity worse than 6/60
	Blindness	Presenting with visual acuity worse than 3/60
Near vision impairment	N.A.	Presenting with near visual acuity worse than N6 with existing correction

Note that N6, referred to in the last row of the table, is one level below normal newspaper print.

How we see: The anatomy of human eye

When light falls on the retina (the back of the eye), photoreceptors turn the light into electrical signals. These signals travel from the retina, through the optic nerve to the brain. The brain turns the signals into the images we see. Figure 1 shows the anatomy of the human eye.

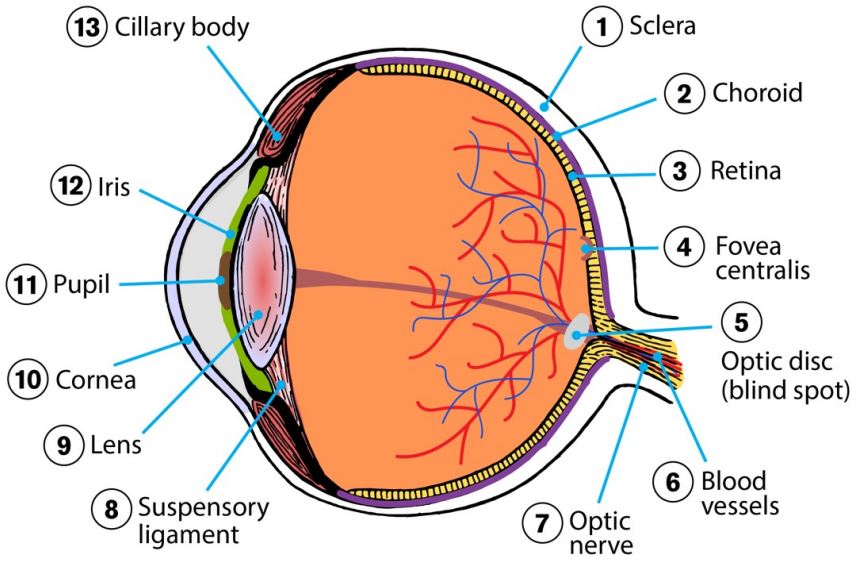

Figure 1: Anatomy of the human eye (Adapted from: **Open Clipart**, CC 0)

The numbering in Figure 1 maps to the following components of the eye:

1. **Sclera:** The white part of the eye composed of fibrous tissue that protects the inner workings of the eye.

2. **Choroid:** The pigmented vascular layer of the eyeball that contains connective tissue and lies between the retina and the sclera.

3. **Retina:** The membrane at the back of the eye that changes light into nerve signals. The retina has two sub-components that relate to how light is being processed by the retina. They are: rods and cones, special cells used by the retina to process light; and macula, a small and highly sensitive part of the retina responsible for central vision, which allows a person to see shapes, colours and details clearly and sharply.

4. **Fovea centralis:** A tiny spot in the centre of the retina that contains only cone cells and enables us to see things sharply.

5. **Optic disc (blind spot):** The raised disc on the retina at the point of entry of the optic nerve, lacking visual receptors and so creating a blind spot.

6. **Blood vessels:** Tubular structure carrying blood through the tissues and organs (a vein, artery or capillary).

7. **Optic nerve:** Bundle of nerve fibers that carries messages from the eyes to the brain.

8. **Suspensory ligament:** Ringlike fibrous membrane connecting the ciliary body and the lens of the eye and holding the lens in place.

9. **Lens:** Located directly behind the pupil, it focuses light rays onto the retina.

10. **Cornea:** Transparent tissue covering the front of the eye that lets light travel through.

11. **Pupil:** An opening in the centre of the iris that changes size to control how much light is entering the eye.

12. **Iris:** A ring of muscles in the coloured part of the eye that controls the size of the pupil.

13. **Ciliary body:** The part of the eye that connects the iris to the choroid. It consists of the ciliary muscle (which alters the curvature of the lens), a series of radial ciliary processes (from which the lens is suspended by ligaments), and the ciliary ring (which adjoins the choroid).

How we see (which can be categorised as normal, near-sighted or far-sighted) is determined by where light focuses in the eye.

Normal vision consists of clear central vision and full peripheral (side) vision. For that to happen, light must focus exactly on the retina and all the structures in the eye must be healthy. If the light does not fall exactly on the retina, a person is said to be **far (long) sighted** or **near (short) sighted**. These conditions can be corrected by wearing glasses or contact lenses.

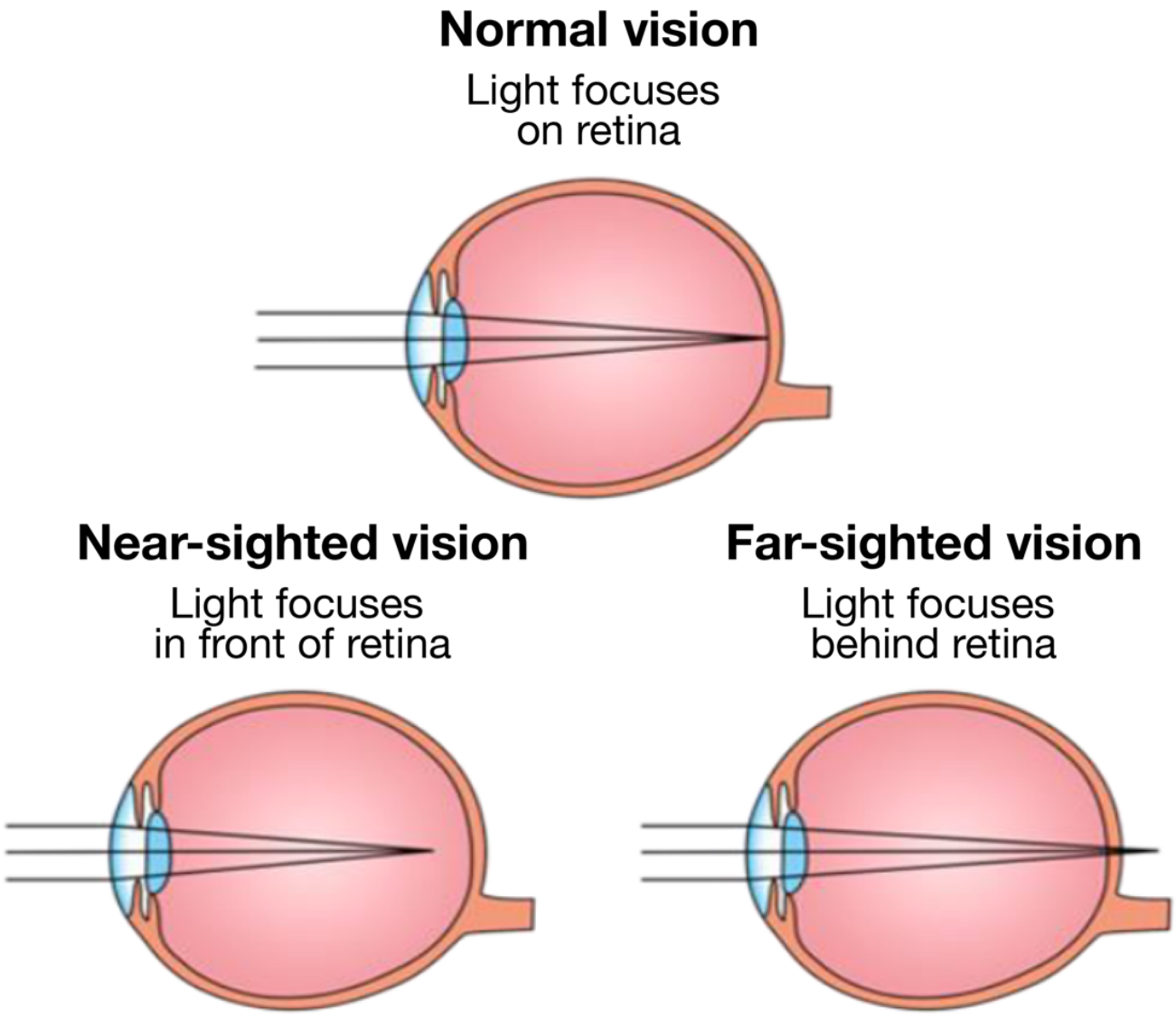

Figure 2: Illustration of where light focuses on the retina in normal, near-sighted and far-sighted vision (Adapted from: **McClain**, CC BY)

We can also differentiate between low vision, central vision and peripheral vision in terms of the way we see objects.

Low vision is when there is significant loss of central vision (visual acuity) or peripheral vision (field), or both, that cannot be fully corrected with glasses, contact lenses, medication or surgery. This loss of vision can be due to injury or disease. Low vision requires significant adjustments to daily life. However, there are specialised low-vision aids that can help maximise remaining vision and increase independence and quality of life.

Central vision is used for activities such as reading, writing, recognising people and things, watching TV and driving – in other words, for all tasks where we need to see detail. Central vision emanates from a very small area on the central retina called the macula. If this area is damaged, it can cause central vision to become blurred and dull. Eventually, it may lead to dark patches (blind spots) in the field of vision.

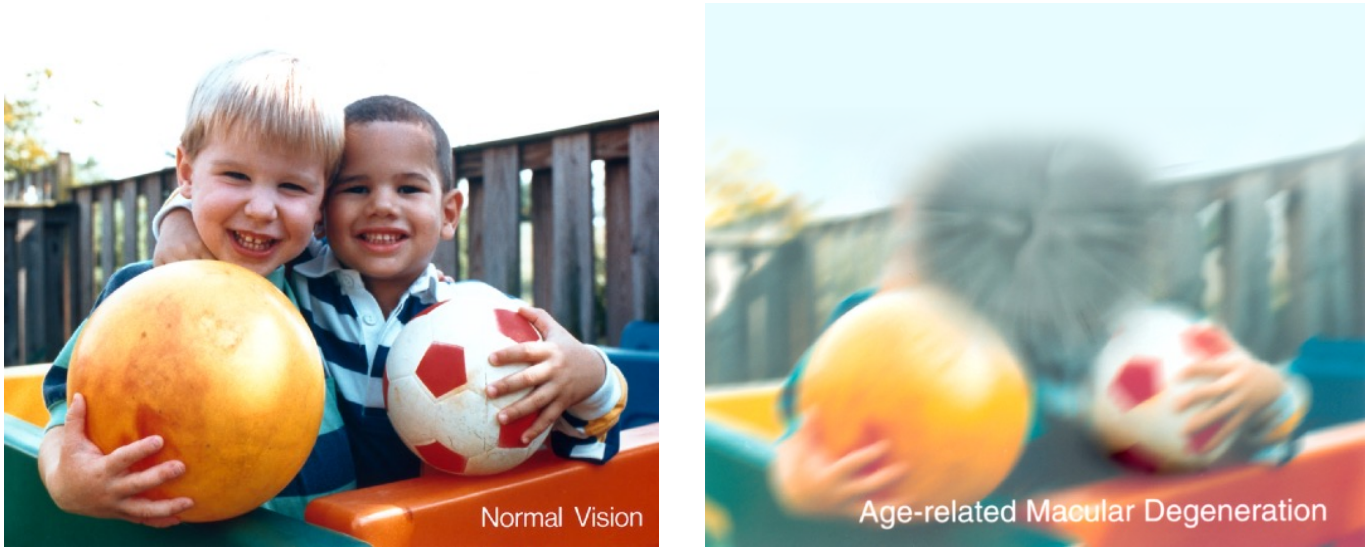

Figure 3: Images showing the deterioration in eyesight that can occur with central vision loss (Source: **National Eye Institute** and **NIH Media Library**)

Peripheral vision is our side vision. Although we are generally focused on what is in the centre of our field of vision, we have another, peripheral field of vision around this. People are often less aware of the importance of peripheral vision. It is not something that we actively use, but it plays a significant role in gathering spatial information. It also helps us to orientate ourselves and is critically important when moving around (see Figure 4).

Figure 4: Images showing clear peripheral vision on the left and deterioration on the right (Adapted from: **National Cancer Institute**)

ACTIVITY

Estimated time: 20 minutes

See What I See: Virtual reality eye disease experience

App name: NEI VR: See What I See
Creator: National Eye Institute
App size: 389.6 MB

Download the free **NEI VR: See What I See** app onto your smartphone. The app allows you to simulate the experience of having various eye diseases: age-related macular degeneration (AMD), glaucoma, cataracts and diabetic retinopathy. There are also quizzes to test your knowledge of these four eye diseases. Try out the different eye disease simulations and explore the quizzes on the app. Reflect on your experiences of the different simulations. What did you learn? How can you apply what you have learnt to positively impact the education of blind and visually impaired people?

Eye conditions that can lead to visual impairment and how they present

There are several conditions that may result in visual impairment. For example, poor visual acuity, field loss, ocular-motor problems, colour vision loss and functional disorders. It is important to understand the different eye conditions associated with vision loss and how they present.

Table 2 provides an overview of conditions that can affect central or peripheral vision.

Table 2: Conditions affecting central or peripheral vision

Eye condition	Description
Albinism	The underdevelopment of the central retina, together with nystagmus (involuntary eye movements), can cause poor vision. Reduced colouring of the iris and retina causes increased sensitivity to light.
Macular degeneration	AMD is the most well-known macular degenerative disease. Stargardt disease is a form of macular degeneration found in young people, which is caused by a recessive gene. In all of these instances, the macula, which is responsible for clear, detailed central vision, starts to deteriorate.
Cataract	A cataract is clouding of the lens. Cataracts usually develop later in life and are treatable. If a young child has cataracts, the retina is deprived of light stimuli and the eye can become amblyopic (lazy) if the cataract is not removed.
Glaucoma	This is a common eye condition that damages the optic nerve. It is often caused by abnormally high pressure in the eye. Glaucoma affects peripheral vision and, if left untreated, can end up as tunnel vision (where there is no peripheral vision).
Diabetic retinopathy	This is caused by damage to the blood vessels in the retina. Poorly controlled blood sugar is a risk factor. Early symptoms include floaters, blurriness, dark areas of vision and difficulty perceiving colour. Blindness can occur. Mild cases may be treated through diabetes management. Advanced cases may require laser treatment or surgery.
Retinitis pigmentosa	Retinitis pigmentosa is an inherited retinal disease that causes progressive loss of night and peripheral vision.

Eye condition	Description
Retinopathy of prematurity	This is a potentially blinding disease caused by the abnormal development of retinal blood vessels in premature infants.
Retinal detachment	The retina pulls away from a layer of blood vessels that provide necessary oxygen and nourishment, often after an injury. It can also result from ageing and high myopia. Symptoms include the appearance of bits of debris (floaters), experiencing sudden flashes of light or a shadow in the vision field. Prompt medical treatment can often save vision in the eye.

Barriers to learning experienced by learners who are blind or have low vision

Teachers encounter several challenges in meeting the needs of children who are blind or have low vision and the heterogeneous nature of visual impairment makes it difficult for most teachers to plan for these learners according to their academic needs (**Agesa, 2014**). Also, learning barriers can be caused by various factors. Some are purely external: tight schedules, too much work, lack of available materials or technologies, and so forth. Others are internal and originate in people's pre-existing experiences, emotions or mindsets. Sometimes internal and external factors join forces.

Visual fatigue relates to tiredness and associated behaviours. Vision-impaired students have to work harder to keep up and the extra work can be taxing. Where quiet spaces and rooms for self-managed breaks are provided, these can assist visually impaired students to remain engaged.

The wider environment that learners with visual impairments are subjected to contributes to their visual fatigue and disengagement. Some examples of environmental barriers include:

- School classrooms, playgrounds and outdoor areas that are too noisy, too bright, too overwhelming or physically difficult to access.
- Work material not provided in the learner's preferred alternate format.
- Rigid adherence to teaching pedagogy resulting in refusal to provide support (such as a specific table and chairs) for a visually impaired learner and unwillingness to incorporate the learner's needs into the teaching and learning period.
- Assistive technology taking weeks (and sometimes months!) to arrive or be repaired.
- Difficulty in locating toilets and washrooms and navigating the school environment.
- Transport options that arrive late or leave early, or that eat into the learner's school time.

These types of occurrences communicate a lack of a welcoming environment for the learner with visual impairment in the school. Parents may interpret these types of barriers as a lack of care and concern for their visually impaired children and their learning.

The impact of visual impairment on learning

The impact of visual impairment on learning will vary significantly according to the nature and extent of vision loss: some learners will have been born without vision, others will have lost it gradually; some will have no vision at all, others will have some vision, be light-sensitive, or have limited peripheral vision. It is also possible that vision and light sensitivity will fluctuate on a day-to-day basis. The learning processes of learners with visual impairment may be affected in the following ways:

- Learners with visual impairment may access information in different ways. This could be through braille, audiotape or enlarged print. Braille readers cannot skim read and may take up to three times as long as other learners to read a text. Learners with some vision may be large-print readers. Many will be unable to read examination questions and handouts in standard print or read their own handwriting when answering examination questions. They may also be unable to take their own notes. Scribes or extra time is needed to carry out some tasks, such as locating words in a text when shifting from one reading medium to another.
- Learners who need information put into alternative formats in low-and-middle income countries must often wait lengthy periods of time for the material to be produced for them. This means that they will often fall behind other learners in the class who have no vision loss.
- Learners with visual impairment may feel isolated in the learning environment, which can have an impact on their learning.

Headaches often result from eye strain. This may reduce considerably the study time available to these learners. Participation and interaction in tutorials may be limited. It is difficult for learners who cannot see the body language and interactions of others to feel comfortable about participating. Judging when it is appropriate to interrupt or to take a turn in discussion is particularly difficult.

How do we identify learners with visual impairments in the classroom?

It is important to note that there could be challenges or problems with reading, even in the absence of visual impairment. There may, for instance, be reading difficulties associated with perceptual issues.

The following observations might indicate the need to investigate a learner's vision further:

- Holds a book very close to the eye (10–20 cm away).
- Holds head at an extreme angle to the book when reading.
- Struggles to read ordinary print.
- Cannot see writing on the board.
- Covers one eye when reading.
- Squints when doing near-vision work.
- Constant poor posture when working; slouching down over book.
- Moves head back and forth while reading instead of moving only the eyes.
- Poor attention span, drowsiness after prolonged periods of work in which they need to focus on something more than an arm's length away.
- Homework requiring reading takes longer than it should.
- Occasionally or persistently reports seeing double while reading or writing.
- Loses place when moving gaze from desk work to writing board, or when copying from text to workbook.
- Reports blurring or doubling.
- Must use a marker to keep their place when reading.
- Inability to stick to writing within ruled lines, irregular letter or word spacing.
- Reverses letters (b for d) or words (saw for was).
- Difficulty drawing graphs and diagrams.
- Does not complete tasks in the same time as other learners.
- Shows light sensitivity or needs more light.
- Has spelling problems.
- Confuses colours.
- Shows difficulty sequencing ideas in a logical order.

The following observations related to learners' inability to recognise letters or words may also be prompts for further investigation:

- Re-reads or skips words or lines unknowingly.
- Fails to recognise the same word in the next sentence.

- Misaligns digits in columns of numbers.
- Has headaches after reading or near-vision work.
- Burning or itching eyes after doing near-vision work.
- Blinks excessively when doing near-vision work, but not otherwise.
- Rubs eyes during or after short periods of reading.
- Fails to visualise (can't describe what they were reading about).
- Struggles with notetaking during a lesson.
- Difficulty organising notes, study materials and time.

After teachers identify these barriers, and refer when necessary, they will need to find ways to adapt and accommodate learners with visual impairments in an inclusive classroom. In the **next chapter**, we will discuss classroom adaptation and accommodation to make learning more friendly for all learners. We now discuss the importance of human rights and legal issues for learners with visual impairments.

The importance of human rights and legal issues for learners who are blind or have low vision

The importance of human rights in the educational journey of learners with visual impairments cannot be overlooked. We must acknowledge that all human beings have the right to be treated with respect and dignity. Therefore, all learners have this right, too. By implication, all learners have a right to quality education and are entitled to opportunities which will promote their dignity and holistic development (**UNESCO, 1994**).

According to the report *Left in the dark: Failure to provide access to quality education to blind and partially sighted learners in South Africa* by Fish-Hodgson and Khumalo (**2015**), educational facilities catering to visually impaired learners in South Africa are in crisis. The interviews performed with all 22 schools catering to visually impaired individuals in South Africa reveal a narrative of disregard and refusal to acknowledge the basic educational rights and equality of visually impaired children. This situation ultimately results in a significant infringement on their inherent human dignity.

The Department of Education's **Education White Paper 6: Special Needs Education (2001)** demonstrates a national commitment to granting equal educational opportunities to students with disabilities who have been marginalised by inadequate education provision. W*hite Paper 6* is focused on developing inclusiveness in the training and education system. Teachers have an explicit function and responsibility to support and enable this drive towards inclusion and they may, arguably, be the most important facilitators (or barriers) to inclusion, as they are able to

either implement or stymie inclusive educational policies and practices (**Bornman, 2020**). The performance of learners with visual impairment is significantly influenced by the accessibility of learning and teaching support materials (LTSM), as well as the effectiveness of assessment methods. The violation of learners' human right to equal access to excellent education occurs when they are not provided with equitable access to the curriculum, which includes LTSM and assessment components (**Viljoen, 2020**). Ensuring the safety and security of learners who have visual impairment encompasses various aspects, such as physical well-being, emotional support, gender equality, healthcare provision, social protection and the protection of individual human rights.

Conclusion

Our eyes and the way we visualise things stir our curiosity, invite us to explore and engage with people, objects and activities, and allow us to orientate and navigate the world around us. Vision is therefore acknowledged as one of the primary senses for learning. How can we make life easier for or support learners with visual impairments? Teachers, parents, learners, education officials and all stakeholders have a role to play. In this chapter, we discussed the nature of visual impairment, conditions that lead to visual impairment, effects of visual impairment, barriers to learning and the human rights that should be enjoyed by all. Learners with visual impairments are able to learn equally alongside their non-disabled counterparts when efforts are made to provide needed resources. The **next chapter** will discuss how teachers and disability practitioners are making adaptation and accommodation to make learning meaningful for learners with visual impairments.

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