Low vision devices for children


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The majority of children with low vision can have their visual functions enhanced by a combination of environmental modifications and low vision devices.

Environmental modifications include placing children near windows to give them better light when reading, allowing them to use felt-tipped pens (which produce thicker lines, thereby making the children's own writing easier to read), or encouraging them to wear hats and caps to prevent glare, especially when outdoors.

The low vision devices available for children can be grouped into three main categories: optical, non-optical, and electronic.

Optical low vision devices

Most children with low vision can significantly increase their near visual acuity by employing their strong ability to focus on nearby objects (accommodation), or by 'squinting' to produce a pinhole effect if they have poor accommodation. Children with low vision normally achieve the required magnification by the 'approach method', i.e. by moving their eyes closer to the object of interest to see it in more detail. The magnification gained in this way is called relative distance magnification.

Children who cannot see near objects well enough will need some type of magnifier.

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Single-vision spectacle magnifiers

Children often favour the use of single-vision spectacle magnifiers, because they do not mind the close working distances needed and have short and flexible limbs. Single-vision spectacle magnifiers can provide a large field of view and relax eye strain; this prolongs a child's viewing time. (By contrast, adults who acquire low vision later in life tend to resist putting reading materials close to them.) The other advantage of the single-vision spectacle magnifier is that it is hands-free. Its greatest disadvantage, however, is that it involves a relatively short viewing distance, which usually causes head and neck fatigue after prolonged use.

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Hand-held magnifiers

Hand-held magnifiers are favoured by children with low vision because they are easy to handle.[1] They offer flexibility in magnification: children can change both the distance between the magnifier and the object or text, and the distance between the eye and the magnifier. The greater the distance between the magnifier and the object or text (provided it is less than one focal length), the higher the magnification will be. Decreasing the distance between the eye and the magnifier also increases the magnification power. Hence, children can choose the most suitable and comfortable viewing distance for each of their activities, depending on the size of the object or the text. In addition, the availability of strong magnification powers and built-in illumination also make hand-held magnifiers a good choice, especially for those children who need above-average illumination,[2] such as children with retinitis pigmentosa and maculopathy. However, the use of hand-held magnifiers requires steady hands and good eye-hand co-ordination, especially for high-power lenses. This limits the usefulness of these devices for young children and those with upper limb disabilities.

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Stand magnifiers

Stand magnifiers offer the most stable image compared to single-vision spectacle magnifiers and hand-held magnifiers; this makes them a good choice for beginners, especially those who require high magnification. Built-in illumination, usually provided by means of a relatively bulky battery handle, is also available. However, stand magnifiers are comparatively more expensive and bulkier than hand-held or single-vision spectacle magnifiers; they also require a smooth surface on which to rest the stand.

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Dome magnifiers

Dome magnifiers are a type of specially designed stand magnifier that can double the magnification for those who use relative distance magnification, single-vision spectacle magnifiers, and hand-held magnifiers. They are easy to use, but 1.8x is the only available magnification power.

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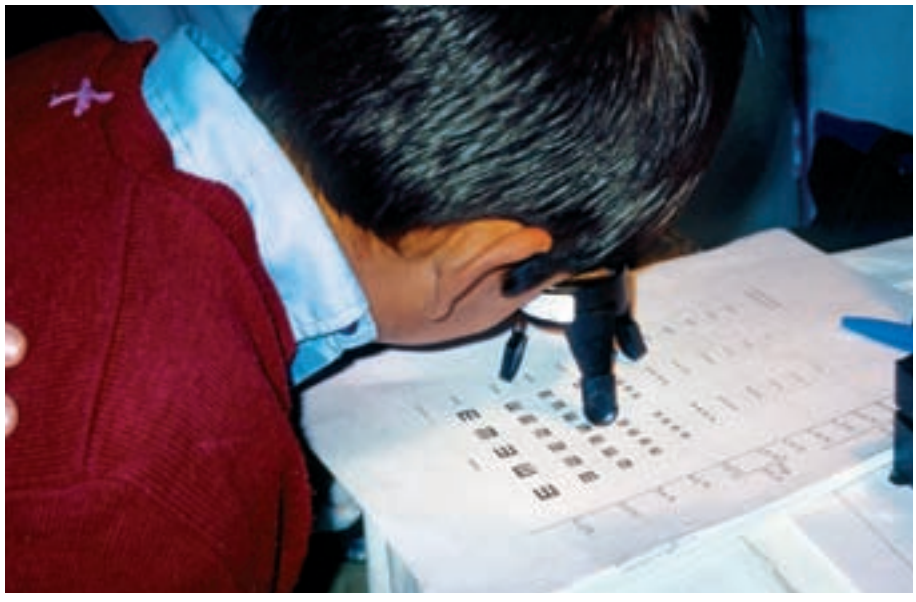
Extra-short focus monocular telescope

Many children with low vision like to use an extra-short focus monocular telescope, an optical low vision device that can conveniently bring the image of a distant object many times closer. A 4x telescope can make something that is 20 m away visible at 5 m, and an 8x telescope can shorten the distance to 2.5 m. The telescope offers advantages to children in many daily activities, such as reading what is written on the blackboard and reading street signs and bus numbers. Children require intensive training to learn the focus control and target searching techniques they need to use the telescope well. This low vision device also requires good eye-hand coordination to track targets, especially those that move.

Karin van Dijk



An E-chart is used to assess a child's vision while using a stand magnifier. INDIA

Non-optical low vision devices

The use of non-optical devices can compensate for some of the disadvantages of optical low vision devices. For example, tables with adjustable tilt help to improve poor posture caused by short viewing distances and the bending of body and neck over the table.

The use of a table lamp with a 'goose-neck' to control the direction of the light can be helpful for those children who need above-average illumination. On the other hand, children with media opacities such as corneal scarring are sensitive to glare; special absorptive filters, preferably with side shields, are useful for filtering scattered and glare-producing light. Caps and hats are also advised for outdoor activities.

Non-optical devices are reasonably easy to obtain; they can often be bought in stationers', furniture shops, or optical shops. In addition, parents, teachers, or clinicians can make simple devices to assist children with writing or drawing: they can cut black cardboard into frames or 'windows' to create reading slits or writing and drawing guides; they can also draw bold black lines on white paper, which make for easier writing.

Electronic low vision devices

Electronic low vision devices provide the largest field of view, the most comfortable viewing distances, and the highest magnification. However, they are also the most expensive type of low vision device.

The most commonly used electronic low vision device is closed-circuit television (CCTV). It offers brightness and contrast enhancement controls and is a good choice for children with severe visual impairment. However, because CCTV systems are so big and heavy, they are usually fixed in one place, such as a library.

Portable electronic low vision devices are also available, although they are very expensive. They consist of a digital camera which captures images and enlarges them to the desired magnification.

The importance of early intervention

Early intervention with low vision devices can strengthen the visual abilities of children with low vision by reducing visual deprivation at an early age. Low vision devices will provide them with enriched and more accurate visual information, which in turn will improve their ability to learn and their chances of receiving education in mainstream schools with their sighted peers. In addition, learning to use low vision devices at an early age helps children to become confident with their use; it also allows them to feel less socially awkward as they grow up and continue to use these devices.

Important factors for the successful prescription of low vision devices

The successful prescription of low vision devices for all children is dependent on a good knowledge of a child's case history, and of the diagnosis and prognosis of his or her eye disease. Appropriate techniques should be used to obtain detailed information on children's refractive errors and visual abilities (such as visual acuity, visual field, amplitude of accommodation, contrast sensitivity, light adaptation ability, etc.). The practitioner should also have a good understanding of the functions and features of the various low vision devices, and he or she should know how to select and apply the most appropriate low vision devices for children to accomplish their various visual tasks. Training in the use of low vision devices is critical and home trials of low vision devices are advisable; these should be arranged immediately after the initial assessment.

Children should attend their first follow-up visit one to two months after their initial assessment. This will ensure that they have enough time to try the prescribed low vision device at home and at school. Because visual requirements change with age, children should attend follow-up visits every three to six months. This should include those children who have rejected low vision devices at initial visits.

Involving parents and teachers

Children accept low vision devices more readily than adults and with a higher rate of success.[3] They tend to use more than one device, depending on the task: the average number of devices prescribed per child with low vision varies from 1.3 to 2.3.[3,4]

Good communication with parents and teachers is important in order to maximise the successful use of low vision devices. Parents and teachers should be encouraged to note any difficulties children may have when using their low vision devices, especially during the first home trial. They should also listen to any complaints children might make.

Difficulties may include:

- head and neck pain after using low vision devices for a long period
- difficulty in finding the image; too small a field of view
- shadows cast by the low vision device on the item being viewed
- using an unusually close reading distance
- no improvement in viewing posture or no reduction in fatigue.

This information should be discussed in the follow-up assessment. It will allow the practitioner to provide appropriate recommendations.

Resources for low vision devices

Many high-quality and low-cost low vision devices for children are now available from the VISION 2020 Low Vision Resource Centre. It provides low vision devices at an affordable cost, ranging from US $0.4 (for a hand-held magnifier) to US $60 (for a camera to use as part of a CCTV reading aid). Information about the centre and its supplies can be found on the Hong Kong Society for the Blind's website (in the project section): **www.hksb.org.hk**.

References

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