Are there tools for training in the use of closed-circuit television?

Information Monitoring Summary

Documentary research
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Notice to readers

The information in the following pages is not intended to be an exhaustive review of the literature. The goal was to make directly relevant selected information more readily available. Accordingly, not all articles or documents dealing with the topic have been reviewed.

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### Summary

A systematic review of the literature published in 2009 highlights the **lack of studies** on training in the use of closed-circuit television (CCTV), concluding that more research is needed on the subject [19].

Although it would seem clear that CCTV training helps optimize its use and users' reading capacity, **we still do not know which components of CCTV training programs are most beneficial and effective (steps, objectives, sequence, length, duration, reading material, etc.)** [21].

The only detailed CCTV training program that we found is part of the Veterans Affairs Low Vision Intervention Trial, a visual rehabilitation program [16]. On average, $3.7 \pm 1.3$ hours are spent working specifically on CCTVs with an instructor [17]. The protocol and the equipment are standardized. Users are also required to complete 21 exercises at home using standardized material; on average, they spend $8.8 \pm 4.1$ hours on these assignments. Users are provided with documentation (in large characters) on different aspects of CCTV use.

The other documents found dealt more with the **operational skills** that users must develop [4; 9; 13; 16]. The various sources all featured the same basic steps for assessing and training on CCTV use; however, **they rarely specify what kind of equipment was used.** At first, the learning is more technical in nature (how to control the device or determine the optimal parameters). Then the training gradually focuses more on developing and refining the user’s reading and writing techniques and skills. In order to optimize subsequent learning and reading performance, it is important for the user to actively experiment when manipulating the CCTV device [6] and for the trainer to provide feedback [7]. The training must not only be on how to use the device, but also on cognitive and perceptual aspects of reading. Consideration needs to be given to the **ergonomics of the work station**, since this influences reading speed [13; 20; 21].

We do **not have sufficient scientific data to reach a definitive conclusion on the optimal duration of such a training program.** However, we know that beyond simply introducing a CCTV, it is important to provide users with systematic training so that they will know how to control the device well and use it to its full potential [7; 9; 17]. Approximately 5-7 hours of training is needed to improve reading speed [7; 9]; in addition, it would appear that 5 hours of training is as effective as 10 hours [7]. All the studies mentioned the **importance of individual practice** between the training sessions.

The CCTV training and practice sessions can incorporate **material** specifically for training in reading (e.g.: *McGill Low Vision Manual* [15]). Some training programs use academic or perceptual assessment material.
ARE THERE TOOLS FOR TRAINING
IN THE USE OF CLOSED-CIRCUIT TELEVISION?

Electronic magnification systems make it possible to project a magnified image of printed material on a screen using a closed-circuit camera. They are commonly known as closed-circuit television (CCTV) systems. There are two types of CCTV systems: those in which the camera is mounted on a support, and those in which the camera is hand-held. The literature on training in CCTV use deals mainly with systems with a camera support.

The literature on training in CCTV mainly deals with their operation. Most of the information found is descriptive; very little was found on system assessments. In fact, there are instances where authors drawing on the same basic content either discuss system evaluation or refer more to training issues.

A systematic review of the literature published in 2009 highlights the scarcity of systematic studies on CCTV training, concluding that more research is needed on the subject [19]. Furthermore, a review of the literature by Wolffsohn & Peterson (2003) reveals that training in CCTV use is beneficial, but that we still do not know which components of such programs are truly necessary and beneficial, which specific objectives should be targeted in each program stage, which sequence is the most beneficial and efficient, how long a program should last, etc.[21]

Some recommendations may nevertheless be gleaned from the literature. This summary reports on information found on needs assessments, the technical content of training programs in reading and writing, the equipment used, the length of training programs, and the importance of ergonomic issues.

1. Assessing training needs

Preliminary assessments of the needs associated with CCTV use are important because they determine training needs, among other things [13; 14]. For example, it is important to know how a user intends to use the CCTV. Is it for occasional reading or for everyday use? Will it be used to read accounts, a prescription, instructions, recipes, the newspaper, a novel, or a book on art with detailed colour illustrations? Will it be used to look at photographs, images or technical drawings; to complete forms and draft texts; or to do embroidery or arts and crafts projects, build scale models or work on puzzles? How often does the user plan on using the CCTV in these activities? What are his or her priorities? How much time will the user spend on these activities? Where will the CCTV be used: at home, at work, or at school? Where will it be installed? These are all important issues that need to be considered in order to correctly identify the user’s training needs.
2. Components of a training program

The survey found only one detailed CCTV training program: that used in the Veterans Affairs Low Vision Intervention Trial (LOVIT), a complete and standardized visual rehabilitation program. Information on the protocol and the equipment were published in the proceedings of the Envision 2007 conference [16]. LOVIT has many component parts (education and counseling; correction of refraction errors; training on the use of eccentric vision; prescription of visual aids, including CCTV if required and teaching users how to use it; environmental assessments and modifications; independent work at home; etc.). LOVIT involves meeting weekly for a total of 15 hours over seven weeks (one assessment session and six intervention sessions). The training in CCTV takes place in three sessions over 3.7±1.2 hours, on average [17]. The objectives of these three meetings are: (1) to understand the basic principles of CCTV operation and learn how to use one to read; (2) to refine reading skills and learn how to use the CCTV to write (e.g.: reading and completing cheques and forms); and (3) to enhance CCTV capabilities in a variety of reading situations (e.g.: reading mail, labels on medication; letters discussing meetings; newspaper articles, magazines, short stories, telephone books, etc.). The user may have one additional, optional lesson in how to use a CCTV in manual activities (e.g.: adjusting a watch, changing a hearing aid battery, tightening a screw in a pair of glasses) or recreational activities (e.g.: stamp and coin collecting, etc.). The training uses standardized assessment and training equipment developed by Veterans Affairs. A series of 21 exercises were developed specifically for CCTV training, performed by the user at home between training sessions. Users spend 8.8 ± 4.1 hours (on average) completing them [17; 18]. This independent work is reviewed at the start of each session. Users also receive large-character documentation on different aspects of CCTV use (documentation on CCTV controls, reading adjustments, writing suggestions, how to read a newspaper article, etc.). One study shows that after four months the subjects in the LOVIT program reported improved reading skills, unlike the subjects in the control group [18]. On the other hand, we do not know whether the “treatment” effects are due to one or more of the many program components or to their relative weights, and we have no measure of the significance of the Hawthorne effect,¹ which could be present as a result of the personalized attention received by the subjects in the experimental group [18].

The other documents surveyed discuss the technical skills that users must develop [4; 9; 13; 16]. All the sources provide the same basic steps for assessment and/or training in CCTV use, but rarely do they identify the equipment used. All of these agree that the initial learning is more technical in nature (how to control the device), and that

¹ Hawthorne effect: a situation in which the results of an experiment are not due to experimental factors but rather to the fact that the subjects are aware that they are participating in a study and are receiving special attention. This generally results in more motivation and improved performance.
thereafter it gradually becomes more focused on developing and refining techniques and skills for reading and other activities, depending on the user’s specific needs.

We have classed the components of the training programs in three categories: controlling the device, learning how to use it to read, and learning how to use it to write.

a. **Controlling the device** [4; 9; 13; 14; 16]

The authors recommend that users begin by becoming familiar with the different components of a CCTV: *identifying* the components (camera, lenses, reading table, monitor, margin stops, brake); *locating and manipulating* the control buttons (on/off switch; magnification; focus; polarity; colours; aperture control; contrast; luminance) [13]. The user should be shown the various components of the CCTV and how to make adjustments, and then be allowed to practise using familiar material.

1. **Focus**
   - The image’s focus is affected by the distance between the image and the camera.

2. **Linear magnification**
   - It is recommended to begin with a low level of magnification and then gradually increase it until the user can identify the image (minimum magnification). At this stage, the user can identify the target but only by concentrating and not rushing. Continue magnifying the image until an optimal recognition speed is reached (optimal magnification). Beyond the optimal magnification, reading speed no longer increases, or reading may even be slower because there are too few letters in the visual span [21].

   - Optimal magnification will be based on the size of the characters displayed on the screen *and* the working distance [13]. For example, in the case where the optimal magnification is 50 mm (character size) for a working distance of 40 cm, if the working distance is halved (brought down to 20 cm), the optimal character magnification will need be reduced proportionately (halved to 25 mm) in order to maintain that same size angle [1; 13].

   - The preferred reading distance is that for optimal viewing of the image on the screen based on an optimal linear magnification and the user’s *need for retinal illumination* [13].

   - Optimal magnification is also influenced by character font, text layout and document contrast [1].

   - For fast CCTV readers (e.g.: ≥ 75 words/minute), the optimal magnification is only slightly more than the minimal magnification, since optimal magnification gives the user maximum perceptual span [5; 11].
- In general, individuals with central vision loss read more slowly than those who have lost peripheral vision, since they need greater magnification of the characters [10].

- According to a review of the literature by Lowe & Drasdo (1990), people with a visual impairment prefer using a wide-screen CCTV, which provides a wide field of vision, rather than a smaller screen, even if it has superior resolution [11].

- Many studies examined the relationship between reading speed and perceptual span. Perceptual span, which is asymmetrical, is the number of letters in a line of text that can be perceived without necessarily being identified. Even though this information is not necessarily directly useful in identifying a word, it allows the user to plan the length of the next saccade, in part based on the length of the words and the spaces between them [3]. For a reading task that requires manual movement of the XY table, Lovie-Kitchin & Woo (1988) found that the reading speed of individuals with no visual impairments increased up to a “window” of 15 characters [11]. In the study by Beckmann & Legge (1996), a 10-character span in persons with low vision and a 14-character span in persons with no visual impairment allowed them to attain 85% of their maximum reading speed [2]. In a study of nine subjects with visual impairments, Lowe & Drasdo (1990) found a relationship between maximum reading speed and a display of 24 characters, on average, in a visual field at least 70º wide [12]. The differences found between the various studies were due to use of different protocols (e.g.: font used, number of characters per line, line spacing, etc.). However, Beckmann & Legge compared their results with the two studies mentioned above and concluded that reading speed increases up to a perceptual span of 20 characters, after which the user reaches a plateau.

- It is generally recommended to have users experiment with different situations in which the characters on the screen are either too large or too small, and to explain to them the functional implications of these sub-optimal situations.

3. Brightness

- Brightness can be adjusted using either written or artistic material [13; 14]. It is recommended to begin at a low level of brightness and then increase brightness until the subject can be identified (minimum brightness). Then continue increasing brightness until the subject can be identified at maximum speed. Once an optimal brightness is obtained, the target identification speed peaks and then starts to fall when glare becomes a problem [13].

- Brightness to the eye increases as the eye moves closer to the screen. Brightness to the eye varies with the square of the initial eye-screen distance, divided by the square of the final eye-screen distance. Consequently, reducing
eye-screen distance by half effectively doubles the visual angle (magnification) and results in a fourfold increase in brightness to the eye. Similarly, reducing the distance by a factor of 4 (e.g. from 40 cm to 10 cm) increases brightness to the eye by a factor of 16 [13]. Changes in eye-screen distance therefore represent an important factor to be considered when adjusting brightness.

- Use of an electronic line marker (an option that reduces the number of lines displayed at any given time) may be useful in cases of photophobia since it reduces all of the brightness in the portion of the screen not used for reading [13].

- Much like contrast, brightness plays an important role in reading endurance and in being able to see details [13]. The brightness of a screen (its maximum light intensity) is measured using a luminance meter.

4. Contrast

- Contrast is the difference between the luminance of the object (i.e., of the characters) and background luminance (the space surrounding the characters).

- Contrast can be adjusted using word identification material or artistic material [13; 14]. Begin at a low contrast and gradually increase the screen’s contrast until the subject can be identified (minimum contrast). Then continue increasing contrast until maximum identification speed is reached. Greater contrast is not required, and may in fact reduce the quality of the image by producing a marbling effect in the image and by reducing the range of greys [13].

- Image contrast on a screen is maximized in an unlit room (a dark environment). Contrast can be reduced by factors such as: (1) light hitting the screen (e.g.: from ambient light or a poorly located table light); (2) figure-ground colour combinations (e.g.: blue characters on a red background provide colour contrast but not necessarily a contrast in brightness, whereas yellow and blue provide colour and brightness contrast); (3) the brightness of different objects in the user’s visual field, such as a bright window, a bright or dark wall, etc. The brightness of objects in the user’s visual field must be as similar as possible in order to reduce the user’s visual adjustment needs [13]. For example, working in a very dark environment, such as in a darkened room, may lead the user to suffer from screen glare. In contrast, working with a very bright object in the visual field, such as a window in full sun, may reduce the user’s ability to see contrast on the screen [13].

- CCTV reading performance is associated with sensitivity to contrasts [21]. When contrast is maximized, the characters on the screen can be made smaller without reducing reading performance. On the other hand, reading is slowed when the text has less contrast. For example, according to Brown (1981), as
cited by Wolffsohn & Peterson (2003), reducing contrast by approximately 40% slows reading speed by approximately 25%.

- Screen contrast is measured using a luminance meter.

5. Polarity

- According to Lund & Watson (1997), most users have an immediate opinion on polarity preference. If there is any doubt, confirm whether changing polarity affects the user’s thresholds in magnification or reading distance, endurance and speed.

- Individuals with retinitis pigmentosa prefer reversed polarity, which improves their reading performance [5; 21]. This has also been observed among individuals with cataracts [10]. Ehrlich (1987) reports that polarity type has no influence on reading capacity in people with ARM, while Goodrich, Mehr & Darling (1980) [8] say that such subjects prefer using reversed polarity.

- Reversed polarity is appreciated by individuals with greater sensitivity to intense light and photophobia [13]. Indeed, since a screen’s background is black, screen flicker is much less likely to be seen or to be considered bothersome under reverse polarity [13]. On the other hand, a black screen is more reflective of the light-coloured objects in front of it, such as the user’s face, a light-coloured wall, lights, etc. Reverse polarity would also be less useful when looking at photographs and illustrations [13].

- When the screen’s refresh rate is slower than the movement of the image displayed (e.g.: a line of text scrolling from right to left), an after-image appears on the screen, such as a “smear,” and this reduces image quality and readability [13]. This phenomenon is accentuated by reverse polarity, although, in this case, this disadvantage is compensated by reduced glare and flicker [21].

b. Learning to read on and use the reading table [4; 9; 13; 14; 16]

In general, it is recommended that the instructor begins with a demonstration, placing his hands on the users’ hands while manipulating the commands or moving the tray. Then the user is left to experiment on his own (or with guidance), using the XY table (or reading table). It is important to have the user actively use and control the XY table, since this is clearly the more effective approach to acquiring reading speed than having the instructor move the table while the user reads what is displayed on the screen [6]. The instructor should provide feedback to the user during these training periods (e.g., changes in the working distance, in following a line, in the line return; feedback on reading performance; assistance in the letter and word recognition phases; positive reinforcement) [7]. The training must cover not only the mechanics of the device, but also the cognitive and perceptual aspects of reading.
1. Moving the reading table in the XY plane
   - Show the user how to adjust the friction brakes (if this option is available) so that there will be sufficient friction to make the table easy to control. Also show how to adjust the tab stops; if the device does not have this option, show the user how to use his left hand as a tab stop (stopping the table with a hand when returning it to the left) [13].
   - You can demonstrate how the “reading table – camera” system works without using the CCTV; take a page with large characters printed on it and place a “window” of black construction paper on top of it. Hold the “window” over the sheet of text and let the user manipulate the sheet of text. This allows the user to better conceptualize and understand how to operate the reading table [13].

2. Reading a line of text
   - Teach the user the importance of properly positioning the reading material on the reading table so that the lines of text are horizontal and parallel to the upper and lower edges of the table.
   - For users with motor or spatial orientation problems, it is recommended that you begin with very simple exercises, such as following a line connecting two symbols, in different axes.

   ♦ ──────────────────────────── ♫
   ♠ ──────────────────────────── ♪
   ♣ ──────────────────────────── ♫

   - In the initial practice sessions, use material with wide line spacing.
   - Books of games can be used (visual tracking, visual discrimination), as well as reading exercises (e.g.: McGill Low Vision Manual [15]).

3. Reading several lines of text
   - At the beginning, the material should be simple so that the user does not need to concentrate on content since, at this stage, the training is focused on developing new perceptual-motor skills. It is also recommended to use material familiar to the user. The user will then be better able to recognize what is written and develop or use skills at predicting words, and will more easily understand what is being read. This reduces stress and may even prevent discouragement.
   - Show the user that long words do not need to be read in their entirety. Encourage him to read the first letters of the word and anticipate the rest, based
on the word’s form and size rather than by spelling it out letter by letter. With practice, anticipation makes it possible to increase reading speed.

- Begin with two lines of text. Add lines as the user begins to master the exercise.

- Using a line marker or an electronic reference line may prove very helpful (if the device has these options).

- If required, use perceptual "flags" at the start of each line to help the user better understand and master the back-and-forth movement required to read continuous text. For example:
  - A green dot at the start of the line and a red dot at the end, drawn on the text;
  - If you are using a black and white CCTV, use the "Go" symbol at the start of the line and the "Stop" symbol at the end;
  - A dotted line connecting two lines of text;
  - Numbering the beginning and the end of lines.

- Increasing character size decreases the number of characters displayed in the window [12]. As a result, the reading table will need to be moved more often in order to display new material. The angular movement of each character on the screen also increases, proportionately with increased character size. This increase in the frequency and speed of characters from right to left in the parafoveal and peripheral visual fields generates opto-kinetic saccades. The information displayed on the screen may be obtained during pauses between saccades. Lowe & Drasdo (1990) report two possible lateral navigation techniques. The first is to use short, rapid table movements to alternately present and move several characters at a time, in a saw-tooth cycle. The other technique, described as opto-kinetic reading, consists of moving the platform in a regular and continuous manner at a speed that allows the user to fixate the displayed characters during pursuit movements. Is one of these techniques more appropriate than the other? There does not yet appear to be a clear answer to this question.

4. Skimming and locating

- The text must be skinned in order to locate the desired information, and then the image magnified to read the words.

- A systematic approach should be taken when beginning to scan a document, beginning at the top in the case of continuous text. With an invoice or an image, begin with minimal magnification in order to develop an overall idea of the image, then increase the magnification and scan the image to see the desired details.
- The following exercises are examples of how to demonstrate and practise location techniques.
  o A sheet of paper with different symbols in each corner, in the centre and in each quadrant. Prompt the user to find them, one at a time.
  o A sheet of paper divided into columns: ask the user to find and read the second column, the last symbol or word in the last column, etc.
  o A standard letter: ask the user to identify the sender and the date, the content of the letter, etc.
  o A book: ask the user to find the title, the author, the publisher, the year of publication, certain chapters, etc.
  o Lists of words: a dictionary, an encyclopedia, a telephone book, a bus or train schedule, etc. (use material that is meaningful to the user).

- Use of optional CCTV components, such as a line marker, may also prove useful.

4. Characteristics of hand-held cameras

- Some magnifying systems are designed so that the user holds the camera and moves it over the document instead of moving the document under the camera. This type of system is more demanding in terms of motor skills, and the eye-hand coordination required is different from that when a CCTV is mounted on a support. The movement is from left to right and from top to bottom, in contrast to that required in a support-mounted system. If the user has difficulty maintaining straight-line movement, a ruler or template may be placed under the line of words to help guide the camera [13].

c. Learning to write [4; 9; 13; 14; 16]

1. Learning the technique for writing using a screen

- In the initial practice sessions use a low magnification, a felt pen and a piece of lined paper (very thick lines). Lock the table in position, because any table movement will make extra demands on the user's motor skills.

- Starting out, the instructor can place his hand on the user's hand to guide the movement while the user watches the pen's movement on the screen. Show how to position the pen, based on the image on the screen. Remind the user to watch the screen rather than the table.

- Ask the user to write his name; almost everyone can use motor memory to write their name.
2. Eye-hand coordination skills, stabilized table
   - Begin by drawing simple forms, and then increase the level of difficulty as the user becomes more skilled.
     o Make a point in the middle of a circle;
     o Draw simple lines and curves; simple geometrical forms (e.g., commercially available books of games);
     o Place an “X” in a box; draw a smiley face and a matchstick man.

3. Writing words
   - Using a locked table: have the user write the numbers 1 to 10, the names of members of the user’s family, a shopping list, a short quote, and mathematical equations; have him correct mistakes in a text or complete words.
   - Once the user has mastered writing on a stabilized reading table, unlock it.
     o Show the user how, when the table is pulled to the left at an appropriate speed, the place where the pen appears on the screen is virtually still, i.e. it does not appear to move.
     o Advance to the use of a crayon or regular pen and ordinary lined paper (thin lines).
   - Perceptual landmarks can be used as required (e.g., a band of brightly coloured paper along the full length of the left margin).
   - Should the user need to complete a form or a cheque, remind him that a high magnification must be used to read the information and that the magnification must be reduced for writing [16].

3. Training material

Several authors recommend using material that is familiar to the user, such as a photograph or recipe. One can also use simple, motivating texts in order to maintain the user’s motivation and make the exercise more enjoyable (e.g., short jokes, quotes, song lyrics, etc.).


Material prepared expressly for teaching reading skills may also be used. For example, Overbury & Conrod (1990) have published the McGill Low Vision Manual that has 10 reading and writing lessons designed to improve the use of visual aids, including CCTVs [15].

The Internet site of the Texas School for the Blind and Visually Impaired provides a list of the documents that they use in their CCTV assessments and training (http://www.tsbvi.edu/).

If CCTV training is targeted more at advanced reading skills than occasional reading, the assessment should also comprise writing skills, including reading accuracy, speed, understanding and endurance [13].

4. **Length of training**

There is no consensus on the optimal length of a CCTV training program, and very little information is available on this subject.

In the LOVIT program, an average of $3.7 \pm 1.3$ hours is spent on CCTV training and revision of related independent work performed at home [17]. Users are expected to practice between their training sessions using 21 standardized exercises; they spend an average of $8.8 \pm 4.1$ hours in this activity.

Lagrow (1981) assessed the impact of introducing a CCTV, with or without training, to six students with visual impairments (five of the subjects were legally blind, with binocular visual acuity of 20/200 to 20/400; the other had a binocular visual acuity of 20/40) [9]. The experimental design featured three phases: (1) reading without a CCTV; (2) introducing a CCTV combined with one hour of independent practice, twice a week, for 1 to 5 weeks; (3) systematic training to enhance the efficiency of CCTV use and improve reading techniques, twice per week for 1 to 5 weeks. *Compared to the situation with no CCTV*, Situation 2 (introducing a CCTV with independent practice) produced a marked increase in reading speed among the three subjects with the least visual acuity. Among the other three, who had better visual acuity, the study found a reduction in reading speed, probably because their manipulation of the device interfered with their concentration and reading ability. On the other hand, *following the training program* (7 hours on average; range of 5 to 10 hours), a significant and considerable increase in reading speed was observed among all the students when compared to the initial situation without a CCTV; in fact, reading speed doubled. Compared to Situation 2 (introducing a CCTV + independent practice), the training also improved reading speed among all the subjects (average increase of 78 words/minute).
This demonstrates that, in addition to simply giving users access to a CCTV, it is important to provide systematic training in its use so that users become skilled at controlling and adjusting the device and able to use it to its full potential.

In a study of 90 subjects with ARM, Goodrich, Kirby et al. (2004) compared three models of training in the use of optical aids, including CCTV [7]. These models consisted of: 15 training sessions; 7 training sessions combined with 8 independent practice sessions; and 2 training sessions and 5 independent practice sessions. In the three models, each training and practice session lasted 40 minutes. Results: the 7-sessions training program was as effective as the 15-sessions program in terms of maximizing reading speed if the user practised between sessions. On the other hand, if there were too few training sessions (e.g.: 2 hours), it did not lead to as great an improvement, even if the user practised independently at home. Improved reading endurance was not associated with the training model.

In order to reduce the sensations of nausea that can result from reading with a CCTV, Lund & Watson (1997) suggest keeping practice sessions short at the start and reading more slowly. It may also be helpful to use an electronic line marker, so that only the line to be read appears on the screen. Then the field of vision can be gradually expanded as the user begins to feel more comfortable. Finally, have the user look at something in the distance every 10 minutes so that the ocular muscles have a chance to relax.

5. Ergonomics

Consideration should also be given to the ergonomic organization of the work station (e.g.: the height of the CCTV screen) since this has an impact on reading speed [20]. Most users sit too low with respect to the screen, which causes sore necks and headaches, particularly among those who wear glasses with bifocal lenses [21]. The relationship between eye height and screen height should allow the user to read with a cervical flexion angle anywhere between 0° and 20°. Consideration should also be given to the direction of light sources vis-à-vis the screen in order to avoid sources of reflection and glare and ensure optimal contrast. Lund & Watson (1997, pp 120-139) dedicated a whole section of their book to ergonomic principles for work at a CCTV.

6. Conclusion

CCTV training obviously helps optimize CCTV use and users’ reading capacity. However, we still do not know which aspects of the program are the most beneficial and effective (in terms of stages, objectives, sequence, duration, reading material, etc.) [21]. Some recommendations may nevertheless be made, based on the literature.

We know that, beyond the simple introduction of a CCTV, it is important to provide systematic training so that users will know how to control the machine well and use it to its full potential [7; 9; 17]. A 5 to 7-hour training program appears to lead to a significant
improvement in reading speed [7; 9]. It also appears that a 5-hour program is as effective as a 10-hour program [7]. All the studies reviewed underscore the importance of individual practice sessions between the training sessions.

The training should address not only how to manipulate the device, but also cognitive and perceptual aspects of reading. In order to optimize learning and subsequent reading performance, it is important for the user to actively experiment with manipulating the CCTV [6] and for the instructor to provide feedback [7]. At the start of the training, it is recommended to use material that is simple and, if possible, familiar to the user. Then more complex elements can be gradually introduced. It is also worthwhile to use reading training methods developed for people with visual impairments as well as educational or perceptual assessment material (e.g.: *McGill Low Vision Manual* [15]). USA Veterans Affairs has developed standardized material for practising with a CCTV [16]. Consideration must also be given to the ergonomic organization of the work station, since this influences reading speed [13; 20; 21].

Training on CCTV use is certainly important, but more research is needed in order to be able to develop evidence-based training programs.
7. **References**


