

CHAPTER 1

INTRODUCTION, STATEMENT OF THE PROBLEM, AND AIM OF THE STUDY

1.1 INTRODUCTION

The processes of reading and writing, two of the four language arts along with listening and speaking, are integral features of the lives of many people. While reading and writing are often used as leisure activities, they also play an important role in determining the level of success. "Today, more than ever, those with the ability to communicate through reading and writing have the key that opens doors of employment, recreation, and enlightenment" (Holbrook, Koenig, & Smith 1996:1).

Before the invention of the printing press by Gutenberg in the fifteenth century, books were in short supply, as they had to be written manually by monks. Moreover, the cost of books was prohibitive, with the result that only the wealthy could afford to buy and read them. This privileged group included the clergy and certain members of the nobility (Humphrey & Humphrey 1990:31). With the proliferation of printing houses and the production of books, magazines, journals and newspapers on a large scale, anyone who can read has the opportunity to do so. Even if books and other reading materials are unaffordable, libraries throughout the world stock large quantities of reading materials that are easily accessible to the average reader.

But reading is certainly not confined to books, newspapers, magazines or journals. Today, many people read hundreds or even thousands of words daily without even looking at a book, newspaper or magazine to do this. They read their mail, street signs, advertisements on billboards, package labels, the wording in television commercials, etc. (Bamman 1988:157). Using their computers, many people read e-mail messages, documents, spreadsheets, databases and information on internet sites.

For Staiger (1990:48), reading begins as soon as the child responds to and becomes aware of stories. He maintains that the infant who is read to by the mother - even if the stories are not understood - learns that reading is a comfortable experience, and that

words and pictures must be good. Later, when the stories become pleasurable on a different level, this attitude towards reading will continue.

Prior to the advent of the typewriter and computer, pens and pencils were used to write messages, letters, documents and books. Today, in many homes, educational institutions and business organisations, computers are used with greater frequency to generate formal and informal documents. However, the pen and pencil continue to be used by a sizeable number of persons, either because they prefer the convenience of these writing devices, or because they have not been introduced to computers. Even those who rely extensively on their computers frequently resort to the pen or pencil to record telephone numbers, or to write messages, recipes, etc.

While the issue of the effectiveness of a reading and writing medium for sighted persons is not raised in serious debate, the same is not true for persons who are blind. In fact, the reading and writing modalities used by persons who are blind have been the focus of ongoing research in an effort to establish their comparative effectiveness. However, the findings of such research could potentially influence the selection of a particular medium, regardless of whether it responds to an individual's reading or writing needs. It is essentially for this reason that the current study focuses on the impact of the various reading and/or writing media on the education and employment of persons who are blind, rather than concentrating on comparing one or two media.

1.2 EXPLANATION OF CONCEPTS

1.2.1 Reading and writing media used by persons who are blind

Although there are several reading and writing media used by persons who are blind, a detailed description of which will be provided in chapter three, for the purposes of this study, these reading and writing media have been grouped into three categories, namely:

- Audio media
- Tactile media
- Electronic, audio/tactile media

Audio media include the following:

- Audiotapes
- Talking books
- Live readers/scribes

Tactile media include the following:

- Braille
- The Optacon

Electronic, audio/tactile media include the following:

- Optical character recognition document readers
- Refreshable Braille displays
- Portable electronic notetakers
- Computers with text-to-speech software

In discussing the various reading and writing media, attention will be given to how information is accessed or generated using these media.

1.2.2 Blindness

The World Health Organisation defines blindness as 3/60 (finger counting at three metres) (Vaughan, Asbury and Riordan-Eva 1999:384). However, in South Africa, a person is registered blind if he/she has a visual acuity of less than 6/60 with correction.

It must be emphasised that in the context of the measurement of visual acuity, the figure 6/60 does not represent a fraction. It means that the person with a visual acuity of 6/60 would be able to see at 6 metres what someone with normal vision would be able to see at 60 metres (Best 1992:2).

Although the term *visually impaired* is used in many countries to describe both those who are blind and those with low vision, the terms *blind* and *partially sighted* are widely used in South Africa, being endorsed by the South African National Council for the Blind.

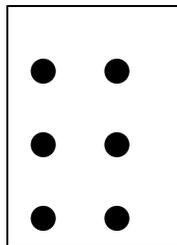
For purposes of this study, the term blind will be used to refer to those persons who are either totally blind, that is, having no light perception, or those who have limited light perception, but are unable to read print, even with optical or magnification devices, or when the print font is enlarged. A detailed discussion on blindness is included in chapter 2.

1.2.3 Braille

Braille (a detailed description of which will be provided in chapter 3) is a system of embossed dots invented by Louis Braille in the 1820's (Jernigan 1994:81). The basic Braille symbol is called *the Braille cell*, and consists of six dots arranged in the formation of a rectangle, three dots high and two across (figure 1).

Figure 1

The Braille cell



To reduce the number of characters used to form words, the system of Braille makes use of *contractions*, which may be a single letter, or a combination of letters or symbols which represent words.

1.3 BACKGROUND TO THE PROBLEM

1.3.1 The processes of reading and writing for persons who are blind

Unlike their sighted counterparts, reading for persons who are blind is confined to material such as books, journals, magazines and newsletters that are available in Braille, or to information in audiocassette or electronic formats. They do not have the benefit of incidental reading material such as street signs, advertisements on billboards, package labels, or the wording in television commercials.

An important observation is that young children who are blind often miss out on the purposes of reading and writing because, unlike their sighted peers, they do not observe their family members engaging in writing or reading activities, such as reading the newspaper, drawing up shopping lists, jotting down telephone numbers, or consulting a recipe card (Swenson 1988:337).

The role of parents in minimising this drawback is often emphasised, as children need to be made aware at an early age of the value of a reading and writing medium if they are to meet the diverse challenges of education and employment. This issue is underscored by Swenson (1988:337) who maintains that parents need to realise that, even though print is an abstract concept for most children who are blind, they can and should be made aware of its many uses. Parents should describe in simple terms what they are reading or writing. Later, when children who are blind begin reading Braille and writing with the Braillewriter, their basic understanding of why people read and write would give them many reasons to practise and enjoy their new skills.

Unquestionably, although Swenson (1988:337) emphasises the importance of building a solid foundation for reading and writing in Braille, the argument would apply equally to reading and writing/recording through other media, such as audiotapes, computers with speech output, and optical character recognition document readers (OCR scanners). Essentially, if children who are blind are not aware of the value of reading and writing, and if they do not enjoy reading and writing, they would be reluctant to use the various reading and writing media available to them.

This idea is also explored by Bettelheim and Zelan (1982:48) who observe that well-meaning educators frequently implore learners to apply themselves more assiduously to learn reading skills, so that they would be able to "get ahead in the world." They (Bettelheim & Zelan 1982:48) argue that children are not strongly motivated by distant rewards. They need to believe that reading is a pleasurable activity, which educators, their parents and other adults engage in as well.

In underscoring the importance of activities to promote reading as a pleasurable activity, Southgate (1984:9) maintains that teachers of reading should draw from a wide repertoire of activities to promote reading skills. This idea is reinforced by Phillips

(1984:14) who asserts that teachers should not only understand the objectives of teaching reading, they should be flexible in applying a programme that responds to the needs, interests and abilities of learners.

An important consideration is that children who are blind should be given the reassurance that the reading and writing media used by persons who are blind are really alternate ways to reading and writing. This would result in a positive attitude to these media, particularly when they realise that these media are just as valuable as the print medium. Moreover, the provision of first-hand experiences in the use of the various reading and writing media would overcome any resistance to these media, as it could potentially be the media they would use for their reading and writing tasks.

Admittedly, as with the print medium, a positive attitude to and respect for the various reading and writing media used by persons who are blind would be inculcated only if these qualities are displayed by parents and educators. Equally important, educators must have the necessary training in the various reading and writing media if they are to impart any meaningful skills to their learners.

1.3.2 Literacy in Braille

Both nationally and internationally, there is a call for greater emphasis on literacy in Braille. The expectation is that educators employed to teach Braille would be able to do so. Equally important is the assumption that learners who are blind would be eager to learn Braille and that they would be proficient in reading and writing Braille when they leave school. Consequently, in trying to establish what happens in the process of teaching potential Braille readers that dampens their fun and enthusiasm, Spungin (1996), Johnson (1996), and Wittenstein & Pardee (1996) offered plausible explanations.

Spungin (1996:271) emphasised the inadequacy of instruction in Braille, difficulties in finding Braille that is produced on a timely basis, and negative attitudes towards Braille. With specific reference to Braille instruction, Spungin (1996:374) maintains that "people do not like to do what they do not know how to do."

In his assessment of the situation, Johnson (1996:276) observed that "the problem is

not that teachers do not know Braille; it is that, with the current emphasis on placing visually impaired children into regular classrooms with sighted students, teachers who know Braille are not teaching children who need Braille." Johnson (1996:276) recommended that "teachers of visually impaired students have to pass Braille competence tests to complete their college training."

Wittenstein & Pardee (1996:132) argue that "training teachers only in the Braille code is analogous to training teachers of print reading by only teaching them the alphabet and expecting that this minimum competence will prepare them for the complex task of fostering literacy in their students." They add that refresher courses in the Braille code, Braille reading methodology and tactual perception need to be available to practising teachers. Their findings from a nation-wide survey in the USA of teachers of learners who are blind indicated that in-service training in the Braille code, Braille reading methodology, and tactual perception is frequently unavailable in the USA, and that teachers who need to refresh their skills receive little or no support for doing so.

With regard to the situation in South Africa, apart from the limited in-service training programmes in teaching Braille offered by the South African National Council for the Blind, together with isolated initiatives at few schools for learners who are blind, educators responsible for Braille instruction are left to cope on their own. The result is that educators find it difficult to be enthusiastic about Braille if they are insecure about their own knowledge of it.

In an effort to provide assistance to educators, Lamb (1996:47) in proposing the "Whole-Language" philosophy of teaching reading and writing, argues that reading is essentially a language task, and that educators should investigate strategies and resources to foster early Braille literacy skills. He maintains that early Braille reading activities must be language-centred, experience based, and associated with meaningful text. To be relevant for the reading process, training in tactile perception must be concerned with language, must be meaningful to a child, and should take into account the special skills required for reading by touch.

1.3.3 Perceived difficulties with Braille contractions

From the literature, it is evident that there are conflicting views on whether reading

Braille is hampered by the introduction of contractions.

Harley (1979:70) emphasises the complexity of the Braille code, and hence, of Braille contractions. He employs the illustration of the child who, looking at a print letter, has 26 possible options for identifying that letter. For the Braille reader, on the other hand, the situation is far more complex. The Braille cell presents 63 options, since there are 6 possible dot combinations within that cell. But many of those dot combinations represent more than one meaning. A tabulation of those additional meanings adds 72 more options, thus increasing the possibilities to 135. However, since those same configurations have additional meanings in the Braille code for mathematics and music, the number of possible options is staggering.

For Lorimer (1983:24), contractions entail much unlearning and relearning of words in Braille, rather than gaining knowledge of words through frequent repetition of the same configuration.

Despite these arguments, Walhof (2001:13) maintains that if contracted Braille helps to improve Braille reading speed, it is important. The fact that teachers tend to lament that not enough books are produced without contractions should serve as an incentive to teach contracted Braille.

1.3.4 Conflicting views on other reading and writing media used by persons who are blind

1.3.4.1 Computer technology

Computer technology has often been hailed as the means by which persons who are blind would be able to gain access to electronic and printed material. With specific reference to the issue of access to the workplace, Luxton (1990:523) maintains that "adaptive technology does, indeed, play a role in visually impaired individuals' performance of a myriad of jobs previously thought inaccessible because of their high dependence on paperwork."

In highlighting the merits of technology, Ashcroft (1984:108) states that "technology is one of the blind person's most powerful allies in overcoming the detrimental impact of

blindness." Additionally, "technology can enable persons who are blind to become more

effective individuals, to function as capable, coping members of society, and to improve their own self-esteem" (Ashcroft 1984:108).

However, while there is support for the use of computer technology, there are opposing views on their value for persons who are blind.

Espinola and Croft (1992:46) assert that "with computers, the ability to access the printed word does not necessarily mean you can read the information with equal access." Pursuing this idea, Corn & Wall (2002:47) stress that educators should not assume that the availability of access technology provides full access to all forms of text and multimedia information.

While acknowledging the value of computer technology, Jernigan (1994:87) emphasises that "technology enhances but does not substitute for the printed word."

1.3.4.2 Audiotapes

Although many persons who are blind listen to material on audiotape, there are opposing views on the value of this medium.

For Hatlen (1996:17) "the sheer volume of assigned reading requires even exceptionally good Braille readers to use a combination of Braille, recorded materials, and live readers." At the other end of the scale, Tuttle (1996:11) maintains that the auditory format presents problems. He argues that "while it is possible to record, index, store, and retrieve personal notes and messages through the use of tape recorders and dictating equipment, persons who are blind who have tried to record notes from a lecture or reference book will attest to just how tedious and cumbersome that particular technique is."

1.3.4.3 Live readers and scribes

In highlighting the importance of live readers, Vancil (1997:74) remarked that "My reader turned out to be the most important person in my life in college. I always hired more than one reader to make sure one would be available when necessary, especially during final exams."

However, with specific reference to the use of live readers during tests, Hansen, Lee, & Forer (2002:271) observe that "problems may include an inconsistent quality of reading, the test taker's anxiety and embarrassment at having the reader reread the material, the reader's mistakes in recording answers, fatigue caused by the slowness and intensity of the reader/test taker interaction, and a greater need for extra testing time."

From the foregoing, it is evident that there are conflicting views on the value of the various reading and writing media for persons who are blind, necessitating further research in this regard.

1.3.5 Limited access to resources

Admittedly, unlike the ubiquitous pen or pencil for sighted persons, simple, portable writing media for persons who are blind, such as the slate and stylus, are not easily available, as these items are invariably sold by a few vendors, or by selected agencies of and for persons who are blind. Furthermore, screen access technology and electronic notetakers are prohibitively expensive, being available only from a limited number of vendors. In addition, only a few organisations stock audiocassette material for distribution to persons who are blind. Equally important, the cost of Braille production is relatively high, and Braille materials such as newspapers and magazines are not available in general bookstores and news agencies.

In an effort to assist persons who are blind in obtaining reading material, although limited, the South African Library for the Blind in Grahamstown stocks books, magazines and journals in Braille, audiocassette and electronic formats for the use of its members.

Tape Aids for the Blind distributes books, magazines and study material to hundreds of persons who are blind throughout South Africa.

Several organisations, notably the South African National Council for the Blind, Braille Services, and Pioneer Printers, produce monthly or BI-monthly magazines in Braille for circulation to interested persons who are blind.

Understandably, such initiatives, although laudable, do not fully address the needs of

persons who are blind in being able to access materials such as daily newspapers, journals and magazines that are available from news agencies.

1.4 EXPLORATION OF THE PROBLEM

1.4.1 Perceived decline in the use of Braille

With the introduction of screen access technology, optical character recognition devices and electronic notetakers, many persons who are blind have increased their independent access to a broader range of information. These devices have proved to be so useful and effective that many persons who are blind have included them as possible reading and writing options, resulting in fears in many quarters that Braille as a reading and writing medium would become obsolete, and that the use of audiocassette formats would be greatly reduced.

However, there are conflicting views on the value of both Braille and technology for persons who are blind, necessitating research in this area. Moreover, the current status of the audiocassette recorder as a reading/recording format needs to be established. Only with objective, quantifiable data can the issue be clarified.

According to Schroeder (1996:136) since the 1980's, organisations of persons who are blind, parents of blind children, professionals in the field, and producers of Braille materials, have decried the nation-wide decline in the use of Braille and in Braille literacy. As a corrective measure, they called for increased availability of Braille materials and greater access to Braille instruction.

These concerns are further highlighted by Johnson (1996:276) who observed that parents, teachers and learners are beginning to recognise that there is a problem when many learners who are blind are no longer learning to read and write Braille.

Paradoxically, although there is wide concern over the perceived decline in the use of Braille, particularly in the United States of America, some Braille production units report an increase in the production of Braille material. For example, the Los Angeles-based Braille Institute, the largest Braille publisher on the West Coast of the United States of America, reported that over a twenty-year period, the Braille press more than tripled its

output from 1,9 million pages in 1977 to 5,8 million pages in 1997 (Pierce 1999:34). This underscores the observation made by McCall (1997:152) that while there has been a popular misconception that Braille as a medium would be made obsolete by advances in technology, technology has in fact, increased the availability of Braille. Programmes, which can quickly translate, print files into Grade 1 or Grade 2 Braille for downloading to Braille embossers are now widely available.

Consistent with this, the three largest Braille production units in South Africa, namely, Braille Services in Gauteng Province, Pioneer Printers in the Western Cape, and the South African Library for the Blind in the Eastern Cape, report significant increases in the production of Braille materials. This underscores the sustained demand for Braille material by schools, higher education institutions, Government Departments, civil society organisations, and individuals.

In its annual report for the period 1 April 2001 to 31 March 2002, the SA Blind Workers Organisation (2002:2) stated that it is proud of its printing press, through which Braille can be provided to any South African in the language of his/her choice. The report states that for the period under review, 1,837,178 pages of Braille were produced. This figure includes its monthly publications in Braille, namely:

- Braillorette
- SABWO News
- Braillorama
- Braille Trumpet (SA Blind Workers Organisation 2002:2).

From the annual report of the South African National Library for the Blind (2002:3), the following information is provided with specific reference to the Braille library services:

- The membership increased from 2,920 in 2001 to 2,988 in 2002;
- The number of Braille books circulated rose from 37,199 in 2001 to 43,613 in 2002, an increase of 17%;
- The Braille section has 13,177 Braille books in its collection; and
- The production of 300 additional books in Braille shows a healthy increase of 30%.
- At the request of the Eastern Cape Education Department, the Eastern Cape

matriculation examination papers were transcribed into Braille. These, together with the Braille newsletters, accession lists, magazines, reports, study material for learners, minutes of meetings, and extra copies of titles generated 354,252 Braille pages, 61% more than was produced in 2001.

The Annual Report of the Pioneer School for the Blind (2003:27) provides the following information on Braille and audio services of its printing/recording division:

- Produced 33823 Braille master pages
- Produced 1727 Braille music pages
- Transcribed 134 Braille music titles
- Transcribed 161 Braille master book titles
- Recorded 517 audio master tapes
- Recorded 419 audio magazines
- Recorded 125 audiotapes for examinations.

Notwithstanding the volume of Braille produced in South Africa, the question that emerges is whether the quantity of Braille material produced actually meets the needs of individuals, schools, higher education institutions, and organisations.

1.4.2 An overview of studies on Braille

While the possibility of a decline in the use of Braille cannot be discounted, limited empirical studies have been conducted to establish whether this perceived decline constitutes a problem. Equally, no studies have asked non-Braille readers who are blind whether the lack of Braille presents serious difficulties or limitations in their lives, or whether they are satisfied with the medium or media they are currently using.

A qualitative study by Schroeder (1996) examined the differences between the functioning of visually impaired adults who used Braille and those who did not. The study sought to establish whether the legally blind adults interviewed considered the decline in the proportion of Braille readers as a problem.

The analysis of Schroeder's research indicated that identity as a person who is blind is crucial to whether a person who is blind will seek to learn Braille. Children who are blind and who regard themselves as blind may observe that Braille facilitates and intensifies

group identification, resulting in the development of self-confidence and self-esteem. Children who do not regard themselves as blind may reject Braille because of its association with blindness. Since they view themselves as sighted people with visual limitations, the introduction of Braille "may well assault the very fabric of their identities because these children identify with the majority and disassociate themselves from the minority" (Schroeder 1996:210).

Reporting on the 1991-1992 nation-wide survey in the USA, Wittenstein and Pardee (1996:202) stated that in response to the survey item on "The use of technological devices", 89,4 percent of the 1486 respondents agreed that "Technological devices should be used to enhance Braille, not to replace it." In addition, it was stressed that both technology and Braille play important roles, and that choices should be made on the basis of the needs and preferences of individuals. Responding to a related item, 91,3 percent of the respondents disagreed with the statement that auditory tape and computer technology will make Braille unnecessary.

Ryles (1996) compared a number of outcomes for congenitally legally blind adults who learned to read Braille or print as their original reading medium. Based on her study, Ryles concluded that "having a knowledge of Braille, even as a primary reading medium, did not increase a subject's chances of employment, but those who had learned to read Braille as their original reading medium and used it extensively were employed at a significantly higher rate. Thus, the extensive and early acquisition of Braille reading skills were cited as the two factors that had a strong impact on employment rates" (Ryles 1996:193).

Although comprehensive, the study by Ryles was limited to visually impaired adults who learned to read either Braille or print as their original reading medium. Since many persons who are blind currently use different reading and writing media, it would be important not merely to compare one medium with another, but rather to examine the efficacy of the different media on the education and employment of persons who are blind.

It is evident that the proposed study differs markedly from the one undertaken by Ryles for the following reasons:

Firstly, this study is not limited to the impact of the use of Braille, as it includes the various reading and writing media used by persons who are blind.

Secondly, the study does not compare Braille with one or two other media, but rather, views all media as being of equal value.

Thirdly, the study focuses on persons who are either totally blind, or who do not have sufficient vision to read print, even with the use of optical devices. Consequently, this study does not include print as a reading and writing medium, although it recognises that

persons who are blind would be able to access print material directly through the use of optical character recognition document readers.

Fourthly, this study focuses on the impact of the various reading and writing media, and is not limited to the impact of reading media alone, as there may be several persons who are blind who use one medium for reading, and another for writing.

1.5 FORMULATION OF THE PROBLEM

Admittedly, there are many blind Braille readers who have achieved success in education and employment. Equally, there are those persons who, despite using other reading and writing media, have also achieved success in education and employment. What emerges as a primary concern is that while there is some support for the notion that competence in Braille results in higher employment rates and educational levels, there is a dearth of research on whether proficiency in the other media impacts equally or more positively on the employment rates and educational levels of persons who are blind.

To add to the dilemma surrounding the efficacy of Braille, there is, according to Castellano and Kosman (1997:17), "a perception by some Braille teachers that Braille is a difficult, tedious reading medium that usually frustrates young children." They add that while this type of perception is not typical of educators in the field of visual impairment, such attitudes are "dismayingly widespread" (Castellano and Kosman 1997:17).

Although there has been a call for a renewed emphasis on teaching Braille, others have

stressed that Braille is only one of the many reading and writing options available to persons who are blind.

In light of the absence of research in South Africa on the impact of the various reading and writing media on the education and employment of persons who are blind, it is crucial that such a study is undertaken in order to obtain greater clarity on the issue in South Africa.

In order to arrive at appropriate conclusions and recommendations with regard to the issue of the impact of the different reading and writing media on the education and employment of persons who are blind, the following issues and questions will be discussed:

- To what extent did developments in the field of blindness contribute to the development of tactual reading and writing media?
- What are the major challenges faced by blind persons in education and employment?
- What reading and writing media are currently used by persons who are blind?
- What impact do the different reading and writing media have on the education and employment of persons who are blind?

1.6 GOALS OF THE RESEARCH

In view of the paucity of literature and research data in respect of this study, the researcher aims to undertake the research with a view to shedding light on the impact that the different reading and writing media have on the education and employment of blind persons in South Africa. The following goals will assist in highlighting the salient issues in this study:

- To trace the development of tactual reading and writing media as part of an historical background to blindness.
- To discuss the major challenges faced by blind persons in education and employment.
- To evaluate the reading and writing media used by persons who are blind.

- To research the impact of the different reading and writing media on the education and employment of persons who are blind.
- To provide guidelines for an Integrated Reading and Writing Model.

An analysis of the results of the investigation may provide valuable information on whether some reading and writing media are more dominant than others; whether there is a preferred medium among persons who are blind; and whether most persons who are blind use a combination of different reading and writing media.

The conclusions based on this study could have significant impact at various levels:

- With regard to materials production for persons who are blind, educators would be confident and equipped to provide material in the formats preferred by learners, whether in Braille, audiotape, or electronic. Furthermore, educators, in planning their learning programmes, would be guided by the realistic role of the various reading and writing media in the education and employment of persons who are blind.
- Equally, the conclusions of the research could also help to settle the long-drawn debate in South Africa on whether Braille is the dominant reading or writing medium for persons who are blind, and whether those who learned to read and write through the medium of Braille have higher employment rates and educational levels.

1.7 RESEARCH METHOD AND DESIGN

This predominantly quantitative study is a combination of a literature review on blindness and the various reading and writing media, and a descriptive and empirical research. There is substantial literature on blindness issues, to which this study will refer as a necessary background to a better understanding of issues pertaining to blindness. The study will also refer to the available but limited literature on the different reading and writing modalities. In addition, the study will use questionnaires to collect data on the different reading and writing media used by blind persons in education and employment. Questionnaires will therefore only be sent to blind persons in employment, as this group would be able to respond to questions on the impact of the reading and writing media on education and employment.

1.8 PROGRAMME OF THE STUDY

The following is a synopsis of the information included in the various chapters of this study:

Chapter one contains an introduction and background to the study, together with a statement of the problem and aims of the study. A brief description of the research design and the methodology is presented. In addition, specific concepts relevant to the study are explained.

Chapter 2 contains a comprehensive literature review, both on blindness and visual acuity, and on the challenges faced by persons who are blind in the context of education and employment.

Chapter 3 provides a detailed evaluation of the various reading and writing media used by persons who are blind, offering greater insight into and an understanding of the media. The literature review provides a theoretical background to the investigation.

Chapter 4 describes the research design, explains the methodology used, and offers a detailed discussion on the design and purpose of the questionnaire used to collect relevant data from blind persons in employment.

Chapter 5 reports on the empirical study, and provides a detailed analysis and interpretation of the data.

Chapter 6 includes a summary of the study, together with a critical reflection and discussion on the implications drawn from the findings of the investigation. The chapter also provides recommendations for possible intervention and future research, and offers brief concluding remarks. A major section of the recommendations is devoted to guidelines for an Integrated Reading and Writing Model.

CHAPTER 2

BLINDNESS: HISTORICAL PERSPECTIVE AND CHALLENGES

GOALS OF THIS CHAPTER

- To trace the development of tactual reading and writing media as part of an historical background to blindness;
- To discuss the challenges faced by blind persons in education; and
- To discuss the challenges faced by blind persons in employment.

2.1 INTRODUCTION

According to Schroeder (1989:290), in today's information age, there can be no question that literacy represents the primary tool by which individuals compete. Schroeder holds the view that "literacy, unlike other skills, is not an end in itself, but rather the means to a virtually unlimited variety of ends. It is the very key to prosperity, since literacy opens the way to information by tearing down barriers of myth and ignorance."

Rex, Koenig, Wormsley, & Baker (1995:9) maintain that although reading and writing are the primary literacy skills by conventional definition, for persons who are blind, speaking and listening are ways to obtain information that is not presented in Braille. They illustrate this by citing the example of a person who is blind who may gain access to a national newspaper through a telecommunications system by entering appropriate commands on a microcomputer (a writing skill). Then he or she may review the contents of the newspaper aurally using synthetic speech (a listening skill) and select pertinent articles to be translated and printed in Braille for more careful examination (a reading skill). However, if the telecommunications system is undergoing technical difficulties at the time, the person who is blind may request and direct (a speaking skill) a live reader to review the paper aloud (a listening skill).

Regardless of the combination of communication skills used, this person who was blind

gained independent access to and made meaningful use of information in the newspaper. In emphasising the importance of communication literacy, Schroeder (1989:290) maintains that in order to compete effectively and, thus, be successful in life, persons who are blind must be able to communicate with many persons on many levels at different points in their lives. This requires the ability to communicate in the medium that is most appropriate in a specific situation. The need for an effective medium is further emphasised by Benson (1996:41) who maintains that if future generations of persons who are blind are to be literate, if future generations of persons who are blind hope to be competitive in society, they must have access to the printed word by a method that will allow writing as well as reading.

Schroeder (1989) and Benson (1996) raise a critical issue, namely, that the medium must suit the context. However, the selection and use of a particular medium would depend on prevailing attitudes to and the impact of a particular medium.

With specific reference to Braille, Caton (1991:2) argues that "attitudes towards Braille on the part of evaluators, teachers, parents, peers, and the visually impaired student may influence the selection of the learning medium, since Braille is, to some, a symbol of blindness." On the other hand, the impact of technology is not automatically a positive one, as the outcome will depend on the choice and application of the technology (Mack 1989:315).

It is evident that for persons who are blind, the selection of a reading and writing medium may not be a simple one. Consequently, although the focus of this study will be on the different reading and writing media used by persons who are blind in South Africa, the development of tactual reading and writing media as part of an historical background to blindness, has been included in this chapter. The purpose of this is to provide a necessary background to and a better understanding of the study.

2.2 HISTORICAL PERSPECTIVE ON BLINDNESS

Although persons who are blind do not yet enjoy the same full and equal status accorded most other members of society, there have been remarkable changes, particularly in the past two centuries (Tuttle 1984:8).

Lowenfeld (1975) identified the following four phases in society's treatment of persons who are blind:

- Separation
- Ward status
- Self-emancipation
- Integration

Tuttle (1984) however employs the term "protection" instead of ward status, and speaks of education and assimilation, rather than of integration in isolation. The following discussion on the historical perspective on blindness will therefore be based on a combination of the phases identified by Lowenfeld and Tuttle, namely:

- Separation
- Protection
- Self-emancipation
- Education and integration

2.2.1 Separation

In many primitive societies and during early historical times, prompted by the prevailing unchallenged assumption that persons who were blind could not contribute to the welfare of the community, most people who were blind were ostracised from society. The cruel behaviour towards people who were blind was rationalised, as they were not regarded as people, but rather as objects who posed a threat to the survival of the society. On the other hand, there were some people, who, although blind, were venerated by their contemporaries.

In the earliest cultures, persons who were blind were rarely permitted to live a normal lifespan, or to contribute to the well being of the family or tribal unit. However, as new cultures and civilisations emerged and gained ascendancy, this attitude changed gradually, so that fear was mixed with pity, and rejection with compassion (Dobree & Boulter 1982:115).

Historical records of many different civilisations reveal the presence of beggars who were blind, indicating that people of the day were willing to give food and other gifts to them, based on pity, compassion, and perhaps by superstition (Lowenfeld 1975:17).

With regard to the situation in Ancient Greece and Rome, beggars who were blind were restricted to specific areas, for example, the gates of the cities, the steps of the temples, and around civic buildings. Many people, including great leaders, were convinced that nothing was gained by keeping alive those who were blind. In fact, the citizens of Rome were exhorted to refrain from providing food and drink to beggars who were blind, believing that their actions would be a double evil. Firstly, that which was given would be lost to the donor, and secondly, it would unnecessarily extend the life of misery being endured by the recipient (Dobree & Boulter 1982:115).

The two Greek philosophers, namely Plato and Aristotle, gave their support to the practice of putting to death imperfect infants, including those who were blind (Lowenfeld 1975:16).

In Sparta and Athens, formal rituals were held to determine whether the degree of disability in a young child was sufficient to justify his/her death. However, it was generally ruled that those who were blind should be put to death (Dobree & Boulter 1982:115).

The practice of ending the lives of physically disabled babies was prevalent in Rome. Small reed baskets were sold in which infants who were blind or infirm were placed prior to being cast into the river Tiber (Koestler 1976:1). In Thebes, many infants were killed, and those whose lives were spared were frequently sold into slavery.

2.2.2 Protection

Although many centuries were to pass before the mass of persons who were blind could derive direct benefit from planned services for their education and welfare, they came at least to enjoy the right to life, the receipt of alms, and, in isolated instances, the personal support of influential people (Dobree & Boulter 1982:115).

According to Kirtley (1975:5) the ideal of individual human worth first emerged in the Orient. In both China and India, useful occupations for persons who were blind were found relatively soon.

Based largely on a philosophical approach, in early China, it was recognised that blindness freed the sightless from the distractions of everyday life, enabling their minds to ponder the mysteries of the world (Dobree & Boulter 1982:115). Some gained enviable reputations as soothsayers, being sought out by many in high office. Music, which was closely associated with blindness and with the individual lives of people who were blind, was recognised as being a unique outlet for their talents. Early Chinese writings contain references to the blind men who, with songs and gongs, travelled the land bringing enjoyment to their listeners while making their contribution to the growth of public awareness of the abilities that were latent in those without sight.

With regard to the situation in India, Buddhism encouraged compassion for persons with disabilities. During the third century B.C. the pious, Asoka the Great, constructed hospitals at public expense and encouraged tolerance toward both the impoverished and persons with disabilities (Kirtley 1975:4). Moreover, some of the people who were blind gained a respectable niche in society as transmitters of oral tradition, both secular and religious. They memorised the stories of past events and travelled the countryside reciting the histories and fables of bygone ages. However, despite this, blind beggars were still to be found everywhere in India.

In Japan, some persons who were blind were welcome guests at the courts of the mighty, where they recited from memory stories and records from the annals of the past (Dobree & Boulter 1982:115).

During the Judaic and early Christian periods, pity and compassion for persons who were blind emerged as dominant patterns. Recognition of persons who were blind as members of the human race brought with it the responsibility to care for one's brother. This care and concern found expression in the establishment of asylums or sheltered environments where the basic needs, such as food, clothing, and housing were met (Tuttle 1984:9). Although persons who were blind were recognised as members of society, they were still not perceived as capable of any meaningful contribution. The dignity and worth of persons who were blind remained in doubt, resulting in their

lowered self-esteem.

In the early Christian communities, children, the aged, and those who were blind were the special wards of the Church. In particular, the deacons took special care of persons who were blind, and wealthy Christians took persons who were blind into their households as their special wards (French 1984:41).

During and after the fourth century, asylums and hospitals were founded, which also provided accommodation for persons who were blind. However, there is no doubt that most persons who were blind were left to a beggar's lot, relying upon the good deeds of individuals and upon alms from the Church.

According to Kirtley (1975:9), in early Islamic countries, the state of persons who were blind was somewhat more satisfactory than in Europe. During the eleventh century, they were offered instruction at Cairo's University of Al-Azhar. Their education extended over a twelve-year period and was accomplished through memorisation. Some persons who were blind became teachers or preached in the mosques, while many others sang or recited the Koran in public and holy places. Egypt was one of the first countries to produce self-supporting scholars who were blind.

For persons who were blind in the Middle Ages, the situation was very different. With the spread of Christianity, particularly across Europe, the practice of offering charity to all who were in need, including those with visual and other impairments, continued to develop.

While limited efforts were made to provide for the educational training of those persons who were blind, the provision of food and shelter, clothing, and other basic necessities of life became common practice, culminating in Paris in 1254 with the establishment of *Hospital des Quinze Vingts* by Louis IX. This was a special residential home for 300 persons who were blind (thus the name - fifteen times twenty) drawn from the streets of Paris and elsewhere in France and staffed by priests (Lowenfeld 1975:36).

Although admission to the Quinze-Vingts was initially restricted to men who were blind, this was later extended to women as well. "Each brother and sister joined with all personal belongings, which, at death, became the property of the asylum. They were

obliged to keep the statutes and secrets of the House, observe certain religious rituals, and execute all allocated chores. In addition, they wore the House uniform -- a long blue gown with a lily on the breast" (Kirtley 1975:6).

To keep the members of the Quinze-Vingts gainfully occupied, some effort was made to provide a modicum of instruction and training in simple crafts. A number of blind thinkers of the day, freed from the constant battle for physical survival, added the fruits of their talents to the growing reservoir of positive contributions being made to thought and life in the communities in which they lived. For the most part, however, the residents of the Quinze-Vingts continued their former lives as beggars, but with the advantage that they did not have to spend the alms they received on food, shelter, or clothing (Dobree & Boulter 1982:116).

While the purposes for which it was established and the results achieved by the Quinze-Vingts at the time of its establishment were elementary by today's standards, it was outstandingly important in the long history of service to people who were blind, and the growth of understanding about blindness, being the first recorded case of acceptance by the State of responsibility for the care and support of persons who were blind. It was, therefore, the forerunner of many similar enterprises later to develop in Europe and elsewhere. These brotherhoods, such as those in Italy, Spain and Germany, were connected with specific churches and were under the patronage of various saints (Lowenfeld 1975:41).

2.2.3 Self-Emancipation

Although very little was done to make persons who were blind self-supporting, it remained for persons who were blind themselves to point the way toward the form which that care should take, by showing in their persons and achievements that their greatest need was that of education (French 1984:68). Therefore, throughout history, there have been stories told about remarkable and talented persons who were blind, who managed, often with insightful assistance, to educate themselves and to make significant contributions to their societies (Roberts 1986:1). These persons, through their own efforts, rose to prominence, despite the prevailing attitudes to blindness and people who were blind.

Illustrious persons in the seventeenth and eighteenth centuries who, despite being blind, were venerated by their contemporaries include the following:

2.2.3.1 Nicholas Saunderson (1682-1739)

Nicholas Saunderson, a distinguished Cambridge mathematician, played an important part in the history of mechanical devices for persons who are blind. Born in England in 1682, Nicholas Saunderson showed a special aptitude for mathematics. Because of the brilliance and clearness of his mind, he became a very able teacher, expounding particularly the new theories of Sir Isaac Newton, among others, Newton's theory of light and colour (Lowenfeld 1975:57).

2.2.3.2 John Metcalf (1717-1810)

"John Metcalf is perhaps the most remarkable blind man of the eighteenth century" (French 1984:69). Born in the north of England in 1717, Metcalf became blind in his sixth year, after having had some elementary schooling. In contrast to many children who were blind, he went about with such ease that he was not thought of as being blind. An inclination toward trade and shrewd sense in bargaining led to various business ventures, which necessitated considerable travelling. Around his home in the north of England, the highways were in such appalling conditions that Metcalf conceived plans for their improvement. Roads that were unspeakably bad for people who were fully sighted were, of course, worse for a blind travelling tradesman. Metcalf began to take contracts for road construction, and soon acquired a reputation as an engineer. He even planned and built bridges.

2.2.3.3 Melanie de Salignac (1741)

Melanie de Salignac was a French girl who had been taught to read with cardboard cutout letters, and who comprehended the basic principles of algebra, geometry, and astronomy (Kirtley 1975:11).

2.2.3.4 Maria Theresa von Paradis (1759-1821)

Maria Theresa von Paradis was a Viennese pianist and music teacher for whom Mozart wrote the Concerto for Piano and Orchestra in B-Flat. When Maria Theresa von Paradis

was about twenty years old, she achieved the distinction of playing in the court church of Vienna. There she aroused such enthusiasm that she was called to play before the Empress, Maria Theresa. The Empress was so pleased with the performance that she settled a pension upon the girl to enable her to secure a more complete education in music (Lowenfeld 1975:62). Maria Theresa von Paradis not only followed music as a

study and profession, but pursued other studies as well, and through her social contact, acquired an even more valuable education (French 1984:74).

On a tour of Europe, this talented woman appeared in Paris, where she met Valentin Hauy. Hauy was considering the organization of a school for learners who were blind, and Maria seems to have had a marked influence, both on the founding of the school and in the selection of materials for the education of learners who were blind (French 1984:72).

Maria was known for marking her playing cards with pinpricks, tangible in relief. She also represented letters by sticking pins in a large pincushion (Harley, Truan, & Sanford 1997:4).

2.2.3.5 Jacob of Netra

Jacob, who lived about the middle of the eighteenth century in Netra, a village of Hesse in Germany, became blind at a very early age. Noting that fully sighted children had a means of written communication, Jacob set about devising his own. "This he did by means of a system of notches cut with his knife in small sticks, similar to the system of "tallies" kept by primitive people" (French 1984:70).

Although Jacob had little more than an elementary education, he displayed initiative and creativity in devising a system of communication. Before his death, Jacob had accumulated a small library, his books being bundles of notched sticks.

2.2.4 Education and integration

2.2.4.1 Introduction

The individual and collective achievements of persons who were blind were the most important single factor that provided the necessary and sufficient conditions for the establishment of educational provisions for children who were blind. However, until the mid-eighteenth century, none of the scattered attempts to educate children who were blind provided the impetus for the development of systematic programmes (Roberts 1986:1).

Initially, emphasis with regard to the provision of education focused on the most educable persons who were blind. With the educability of children who were blind established, more time and attention could be devoted to specific educational problems. "Obviously, the first problems presenting themselves were those of surmounting the technical difficulties caused by the lack of the use of sight in reading, writing, and other subjects to be taught" (Lowenfeld 1983:4). After the introduction of special techniques and devices employed in the education of children who were blind, it became apparent that, given the necessary equipment, children who were blind could receive education comparable to that provided for the seeing.

Schools that were established during the nineteenth century were primarily residential schools, where children who were blind lived away from home and attended classes segregated from their sighted peers. With the development of specialised reading and writing systems and other adaptive aids, children who were blind demonstrated their capability to learn both academic subjects and vocational skills (Tuttle 1984:10).

2.2.4.2 Establishment of the first school for learners who are blind

France was the cradle of new attitudes toward blindness and of the first school for children who were blind. The philosophical groundwork was laid by Diderot, physician to King Louis XV and a great philosopher. In 1749, Diderot published the *Letter on the Blind for the Use of Those Who See*. Much of this essay was based on his association with Nicholas Saunderson and Maria Theresa von Paradis. The competence of these two persons convinced him that people who were blind could lead productive lives and that they could be intellectually competent. Diderot and his contemporaries espoused the needs, rights, value, and obligations of the individual, which included individuals who were blind (Roberts 1986:1).

The next giant step was taken in Paris in 1784 by Valentin Haüy when he established the *Institution des Jeunes Aveugles* (Institution for youth who were blind). He attributed his interest in educating children who were blind to the following two experiences:

One night in a restaurant, he observed a troupe of blind men in grotesque costumes performing a skit, which elicited pity and ridicule from the audience. His revulsion made him resolve to teach blind people to read so that they could earn their living in more dignified ways (Lowenfeld 1975:68).

Several years later, he attended a concert presented by Maria Theresa von Paradis. After the concert, Haüy was intrigued to learn about Maria's ability to read and write using pinpricked letters (Roberts 1986:1).

Haüy immediately set about fulfilling his earlier pledge to educate children who were blind. His first student, Francois Lesueur, was a bright adolescent who had been supporting his widowed mother and siblings by begging (Lowenfeld 1975:71). Francois agreed to study for half the day and to continue begging the other half. Eventually, Haüy subsidised his education so that he could give up begging entirely (Roberts 1986:1).

The Institution's enrolment grew rapidly, partially as a result of demonstrations of learner accomplishments given wherever Haüy could find audiences. He believed that all learners should study music and acquire vocational skills. It was his learners' ability to read and write, to perform music, and to carry out everyday activities that he demonstrated. Admiration for their competence, not pity for their blindness, was what he hoped to engender for his learners (Roberts 1986:1).

In 1786, King Louis XVI requested Haüy to take about 30 of his learners to Versailles for six days during the Christmas season so that he could see the effects of their education. Haüy's hopes that the King would take the Institution under his protection did not materialise.

During the French Revolution, the Institution operated under state protection. However, in 1799, Napoleon abruptly ordered the children to go to a home for adults who were blind, a home which had a limited educational program, causing Haüy to accept requests from several other European countries, including Russia, to help establish

residential schools for learners who were blind (Roberts 1986:1).

In spite of political upheavals in France and in the life of his school, Hauy's contribution was a lasting one. He founded the first school for children who were blind, which became a model; he emphasised reading and fostered the development of embossed line print;

and he believed in the vocational potential of learners who were blind, and instituted vocational training at his school (Roberts 1986:1).

Another great contribution to the advancement of education for blind children was made by Louis Braille in the early 1800's. The significance of Louis Braille's contribution is critical: without a system of effective communication through reading and writing, the education of children who were blind would undoubtedly have remained as it had been through the Middle Ages (Lowenfeld 1975:46). The genesis of the embossed dot code is discussed in detail in chapter 3.

2.2.4.3 Establishment of schools in Britain for learners who are blind

Following the establishment of the first school for learners who are blind in France, a school for learners who are blind was established in Liverpool, England in 1790. It was called an asylum, and the object was "to render the blind happy in themselves and useful to society" (Best 1992:31). This was followed by the establishment of other schools, including a school in Scotland for learners who are blind. These schools focused primarily on music and career-oriented education. This is how the famous Royal College of Music for the Blind in London was established in 1872. However, this name was later changed to the Royal Normal College for the Blind.

Although schools for learners who are blind were well established in Britain by the 1860's, they were independent institutions catering for only a proportion of the children who needed education. According to McCall (1997:4) British schools were pioneered by philanthropic voluntary bodies or religious organisations and were often linked to workshops and homes for adults who were blind called "asylums."

Universal elementary education was introduced in Britain in 1870. However, while there was no obligation on local school boards to include in their provision children who were

blind, significant numbers of children who were blind were admitted to local schools. Nevertheless, when the Elementary Education Act was introduced in 1893, local boards were compelled to provide for the education of children who were blind from the ages of 5 to 16 years, a major achievement at a time when the minimum school leaving age for children was ten years (McCall 1997:5).

Contrary to expectation, at the end of the nineteenth century, the practice of educating children who were blind in ordinary schools declined, and special schools were left to cope with the demand on their own (McCall 1997:5). By 1907, residential schooling had become the norm for children who were blind, and there were over 33 residential schools in England. In the same year, the College of Teachers of the Blind (CTB) was established, which examined teachers in schools for learners who are blind, and awarded diplomas to those who met its requirements. Attainment of the CTB Diploma within three years of the commencement of work in a school for learners who are blind became mandatory under government regulations for teachers (McCall 1997:6).

In accordance with elementary education for children who were blind, most children attended one of the special schools for learners who are blind until the age of 16 and were then transferred to a training centre where they received vocational instruction in skills such as basket making, bedding, brushes, boot repairing, weaving or piano tuning. These skills were introduced not with the aim of employing persons who were blind after being educated, "but to teach them the means of getting a living by work" (French 1984:97).

However, some of the most competent children were selected for secondary education, which was provided at Worcester College for the Blind, Chorleywood College for Girls, or The Royal Normal College for the Blind. These centres prepared their learners for public examinations, which could lead to University or careers in the professions (McCall 1997:8).

An important shift in the provision of education was that during the 1970's and 1980's the distinction between schools designated for learners who were blind, and those designated for the partially sighted disappeared, as the surviving special schools embraced the full range of visual impairment and a wider range of ability.

2.2.4.4 *Establishment of schools for learners who are blind in other parts of Europe*

(a) Austria

In 1799, Johann Wilhelm Klein went to Vienna where he held the office of District Director of the Poor from 1803 to 1826. In his new position, Klein had ample opportunity to observe how the largest number of children who were blind remained without adequate education, as most of them were driven to beggary (French 1984:101).

Prompted by the desire to change the situation, Klein established the first school for learners who were blind in Austria in 1804. According to Lowenfeld (1975:81), Klein relied on his own insights with regard to the education of children who were blind. He published several books, including *A handbook on the education of the blind* (1819), and *History of the education of the blind* (1837).

Recognising the importance of the child who is blind as an integral part of the family and community, Klein argued that children who were blind and children who were sighted should be educated together in ordinary schools.

Klein based his teaching on the sense of touch by using raised letters and relief maps. He even designed a type of linear writing that was impressed on paper with a sharp-pointed object (Landsberg 1998:15). He did not, however, recognise the importance of Braille, and did not respond positively to a letter from Louis Braille, explaining his Braille script. Ironically, Louis Braille wrote his letter to Klein in the latter's needle-stamp print.

(b) Germany

The first school for learners who were blind was established in Berlin in 1806 under the directorship of August Zeune (Landsberg 1998:15). Zeune undertook study tours of the existing schools for learners who are blind in France, England, the Netherlands and Switzerland.

Believing strongly in the all-round development of learners, Zeune emphasised handwork, music and sciences. With regard to reading, he made use of a "reading box" in which letters, numbers and punctuation marks cut out of wood, were kept. Grooves were carved into the lid, into which the wooden symbols fitted exactly. In this way, a learner could put together and read words, sentences and number combinations (Landsberg 1998:15).

Zeune did not favour the idea of persons who were blind being objects of benevolent charity, but wanted them to be as independent as possible. Furthermore, he campaigned for compulsory education for persons who were blind.

(c) Sweden

In Sweden, education of persons who were blind began in 1806 with Per Aron Borg, who was the first to teach a girl who was blind. He soon gained state support for the school (Landsberg 1998:17).

(d) Holland

The first school for persons who were blind in Holland was established in 1808. Learners at the school were taught to read and spell by making use of solid wooden letters (Landsberg 1998:17).

2.2.4.5 *Establishment of schools for learners who are blind in the United States of America*

It was over half a century after the establishment of Hauy's Institution that the first schools for children who were blind were established in the United States of America (Roberts 1986:3). Three private schools were then founded almost simultaneously.

(a) The Perkins School for the Blind

In 1829, the New England Asylum for the Blind, now the Perkins School for the Blind, was established in Boston (Roberts 1986:2). It opened its doors to learners in July 1832,

under the direction of Samuel Gridley Howe, who had visited several European schools the year before.

Howe recognised and respected the individuality of each child. He was convinced that while the curriculum of a school for learners who are blind should correspond to the curriculum of a school for sighted children, he favoured the inclusion of music and handwork (Roberts 1986:4). With regard to a medium of reading and writing, he adapted Hauy's letters and called them *the Boston line letter*. In 1834 he established a printing press to meet the great need for reading material for learners who were blind. However, he did not recognise Braille as a reading and writing medium for learners who were blind.

(b) The New York Institute for the Blind

In New York City, the New York Institution for the Blind, now the New York Institute for the Blind, was incorporated in 1831 and opened in March 1832, with Dr. John Dennison Russ as director (Roberts 1986:3).

(c) The Overbrook School for the Blind

The third school, the Pennsylvania Institution for the Instruction of the Blind, which was founded under the aegis of prominent Quakers, was opened in 1833 in Philadelphia, with Julius R. Friedlander as principal. When the school moved to Overbrook in 1899, it was renamed the Overbrook School for the Blind (Roberts 1986:3).

Like Hauy, Friedlander believed that the medium of reading and writing should approximate closely to that used by sighted persons. To this end, he made use of Klein's raised, linear letter type as a script for persons who were blind. Any other form of writing would have accentuated the difference between persons who are blind and those who are sighted (Landsberg 1998:18).

In the early nineteenth century, it was fashionable for the wealthy to send their children to boarding schools (Roberts 1986:3). This preference led to the establishment of residential schools for children who were blind in the United States.

In 1837, the first state-supported school was opened in Ohio in response to the view that children, including children who were blind, were entitled to a free, public education. Between 1832 and 1875, thirty public and private schools were established.

According to Roberts (1986:4) before the Civil War and the Emancipation Proclamation, it is doubtful whether any Black blind children were educated in the South, since education was largely denied to their sighted siblings. Slowly, southern residential schools began to open separate facilities for these children. In 1931, there were 10 separate departments in residential schools and five independently administered schools for Black children. Generally, the programmes for these children were inferior to those for White children. One of the reasons for this was the poor quality of equipment and educational materials, which were often hand-me-downs from the departments for White children, with the frequently disastrous result that the dots in Braille books were so worn down that they were impossible to be read (Roberts 1986:4). Another reason was that Black teachers were often unable to attend the limited number of segregated training facilities, or to afford the cost of travel to non-segregated facilities in other parts of the country.

A century after the first residential schools were established in the United States, the nature of educational programmes for children who were blind was being reconsidered. Parents and professionals alike began to demand local school programmes which would allow school placement decisions to be based on children's needs and parents' preferences. Consequently, the education system began focusing on integrating children who were blind with sighted children in public schools (Roberts 1986:7). Children who were blind became members of the regular classroom, and were taught with their sighted peers. However, they received specialised instruction from a teacher trained to work with children who were blind.

Since the leaders of most residential schools had fostered the image of the elite boarding school, they were reluctant to enrol learners who did not appear to fit into the academic curriculum. Local public schools, many of which did not have programmes for visually impaired learners, did not have qualified teachers or support personnel, and they had long histories of referring all legally blind children to residential schools (Roberts 1986:8). Consequently, both residential and day schools initiated, modified or expanded their programmes.

Commenting on the issue of integration, Tuttle (1984:10) observes that many children who are blind have found the experience of attending classes with sighted peers to be personally, socially, and academically enriching and satisfying. However, "the physical

presence of a blind child in the classroom with his sighted peers does not guarantee his acceptance by them. Furthermore, integration in the schools does not necessarily result in assimilation into adult society" (Tuttle 1984:10). To illustrate this, Tuttle argues that "blind persons were allowed to be productive as long as they were productive in their place. For many, this meant menial, repetitive jobs such as broom making or chair caning within a sheltered workshop environment. The feelings of being worthy, of being valuable to the community were, by and large, still unrealised by most blind persons, and society did not attempt to foster the healthy attitudes taken for granted by the sighted population."

2.2.4.6 Establishment of schools for learners who are blind in other parts of the world

As this study will not attempt to discuss the establishment of schools for learners who are blind in all countries of the world, brief reference will be made to one country in Asia, and one in Africa. In addition, mention will be made of the first schools for learners who are blind in selected countries.

(a) India

Educational services in India for persons who are blind commenced in 1887 when the first school for learners who are blind was opened in Amritsar with the efforts of a Christian missionary, Annie Sharp (Singh 1989:20). Annie Sharp's initial efforts inspired people like Dr. N.R.D. Chhatrapati of Ahmedabad, who lost his vision at the age of 38. Dr Chhatrapati contributed significantly to the development of educational services as founder of a day school at Ahmedabad in 1895, and later, as the first principal of the Victoria Memorial School for the Blind in Bombay. Askwith was the founder of the school in the southern region of the country (Palayamkottai) in 1890). Her appreciable efforts to devise a Braille code in Tamil became known as Askwith Braille.

Singh (1989:21) maintains that the main controversy during this period was the development of an appropriate common Braille code. Because such a common Braille code was not available, each school practised its own developed code. Thus, a child who was blind from one school was not able to read the written material of another school. A conference to discuss this issue was organized in Bombay in 1923, and was followed by the appointment of a committee in 1941 by the government of India. Today,

in line with most countries, India uses standard English Braille.

(b) Ethiopia

According to Maru and Cook (1990:265), in the past, education and the position of persons who are blind in Ethiopian society were vested in the Ethiopian Orthodox Church. Boys who were blind were brought to the church, where they received instruction in church liturgy. They were chosen for this role because it was believed that they were more devoted to learning than were sighted children. The instruction these children received was mainly through oral memorization. The children were required to memorize verses, books, songs, and poetry and to translate Geez, the classical language used by the church, into modern Amharic. No tactual symbols were used in the instruction of children who were blind.

The first school for learners who are blind was established in Dembi-Dolo in 1917 by missionaries. Other schools for learners who are blind were started under the direction of the Haile Selassie I Foundation and foreigners (Maru & Cook 1990:265).

(c) Other schools for learners who are blind

Stuckey and Stuckey (1998:61-62) list the following additional schools for learners who are blind that were established throughout the world:

- Benjamin Constant School in Brazil in 1854
- School for the Blind in Zagreb in 1859
- National School for the Blind in Mexico in 1870
- Panama School for the Blind in Panama in 1961
- Iran Institute for the Blind in 1964
- Light and Hope Society for Blind Girls in Cairo, Egypt in 1973
- School for the Blind in Thessaloniki in Greece in 1977
- Salvation Army School for the Blind in Jamaica in 1987

2.2.4.7 Establishment of the first school in South Africa for learners who are blind

In 1881, the Dutch Reformed Church in the Western Cape established the first school for the Deaf and the Blind in Worcester. Although the school initially catered for learners

who were deaf, within ten years of its inception, its services were extended to include a section for learners who were blind (Landsberg 1998:24).

The first principal, Mr BJG de la Bat, was trained in the Netherlands. Mr MJ Besselaar, a Hollander who immigrated to South Africa, undertook the education of learners who were blind.

In 1932, the section for learners who were deaf was transferred to a new site. However, the management of the two schools was still undertaken by the Institute for the Deaf and the Blind. Although the schools were under the administration of the state, the church continued to play an important role in their management, which also included financial support (Landsberg 1998:25).

Recognising that academic education in itself would not be sufficient, Besselaar introduced vocational training as well, including music, basket making, piano tuning, mattress making, and knitting (Landsberg 1998:25).

In 1944, the first group of learners wrote the Senior Certificate Examination. In 1957, a section for deafblind learners was added to the school. In 1981, as part of the festivities to commemorate the 100 years of the school's existence, its name was changed to the Pioneer School (Landsberg 1998:25).

Although the school was initially reserved for white learners, from the beginning of the 1990's, it admitted learners from all population groups in South Africa.

In view of the growing number of learners who are blind who needed to be educated, other schools for learners who are blind were established in South Africa, largely through the efforts of religious and community organisations.

With regard to the use of Braille as a reading and writing medium in South Africa, it must be emphasised that formal instruction in Braille commenced in 1881 when the first blind learners were enrolled at the then Worcester Institute for the Deaf and the Blind. As South Africa was then a British colony, the instruction in Braille was based on the British system. Today, while the English Braille code continues to be used in South Africa, special Braille codes for each of the other official languages have been

developed.

2.2.4.8 *The development of tactual reading and writing media*

(a) Introduction

Before the establishment of the first school for learners who are blind by Hauy in 1784, the learning of communication skills was largely a matter of learning to use listening skills, or self-instruction using a tactual code devised creatively by persons who were blind (Harley et al 1997:4).

Didymus of Alexandria in the fourth century is the first important recorded example of a person who was blind using a tactual reading form (Lowenfeld 1975:46). Although he obtained most of his material through listening and used many readers to read material to him, he was known to have used an alphabet carved in wood to learn to read.

In the early sixteenth century, Francisco Luces of Laragossa, Spain developed a set of letters carved on thin tablets of wood (Lowenfeld 1975:46).

In 1651, George Harsdorffer of Nuremburg, Germany recommended cutting letters with a blunt stylus on wax-coated tablets (Lowenfeld 1975:46).

Jacob of Netra, Germany, who lived about the middle of the eighteenth century, used a communication system of notches cut with his knife in small sticks (French 1984:70). He accumulated a small library of books consisting of bundles of notched sticks.

Maria Theresa von Paradis was known for marking her playing cards with pinpricks. She also represented letters by sticking pins in a large pincushion (Harley et al 1997:4).

Other persons who were blind devised their own forms of tactual systems to record material that they believed would be difficult to memorise. Among these earlier systems of communication were the following:

- Knots on a string
- Cut paper letters on threads in the form of words
- Carved wooden letters

- Movable letters cast in lead or tin
- Letters marked with a blunt instrument on wax-coated tablets
- Letters cut out of cardboard
- Pinpricked letters on paper
- Embossed print letters on paper (Harley et al 1997:5).

(b) The use of embossed type

Hauy taught his first learner, Francois Lesueur, to read letters of the alphabet carved on thin wooden tablets. In addition, in his early experiments with teaching persons who were blind, Hauy noticed that he could teach Lesueur to read letters that had been embossed on wet paper through a printing press. He soon taught Lesueur to read embossed letters, and embossed letters subsequently became the mode of the day for his learners who were learning to read (Lowenfeld 1975:72).

Hauy employed a line italic type letter that was very large. To illustrate this, 365 characters occupied approximately 125 centimetres square. In comparison with Hauy's letter, James Gall of Edinburgh could emboss 526 characters in a space of the same size. Samuel Gridley Howe's first Boston line letter was small enough so that 702, and later, 1,067 characters could fit into a space of the same size (Harley et al 1997:5).

With regard to writing, Hauy's learners used a metal pen with a rounded tip to produce raised letters in reverse on the back of heavy paper (Roberts 1986:8). This meant that after the characters were produced, the paper had to be turned over so that the writer could read the raised letters. Although this was a fairly simple process, it provided persons who were blind with a basic writing system.

(c) The raised dot system

The raised line systems soon faced competition from raised dot systems of communication. In 1808, Charles Barbier, a French artillery officer in Napoleon's army, contributed a paper entitled *Ecriture Nocturne* to the French Academy of Sciences (Harley et al 1997:5). At the time, Barbier was attempting to develop a method of sending coded military messages that could be read "under cover of darkness." He developed a 12 (2 x 6) dot cell which could be embossed in a metal writing frame, which is the forerunner of the modern slate and stylus (Lowenfeld 1975:77). Barbier's system was exhibited in 1820 at the School for the Blind in Paris.

Although Louis Braille, a learner at the school, preferred the dot system to the raised line letters, he felt that the elongated cell was too long to fit under the fingertips. He subsequently devised a 6-dot (3 x 2 cell) which was more suitable for the fingertips (Roberts 1986:9). However, the primary criticism against his code was that it did not employ the fewest dots for the most frequently used letters in the alphabet. This limitation was one of several reasons why other systems were devised, and the War of the Dots, as it came to be called, was waged in the United States and Britain for almost 80 years.

In 1829, Louis Braille published his dot code, thereby introducing to the world a reading and writing medium that would be used throughout the world by numerous persons who are blind (Roberts 1986). A discussion on the life of Louis Braille, together with a detailed description of the Braille code, is included in chapter three.

(d) Competing tactile reading and writing media

While the Braille system was being developed, *the raised line letter* introduced by Valentine Hauy had been introduced in schools for learners who are blind in other European countries. Additionally, when the first three residential schools for children who were blind were established in the United States in the early 1830s, they depended heavily on equipment from Europe. Thus, they adopted the embossed Roman letter system used by Hauy (Harley et al 1997:2).

In 1822, Edmond Fry of London offered a prize for the best line letter system. In 1827, James Gall of Edinburgh issued his first book on teaching the art of reading to persons who were blind. In this book, he used a raised print character for a regular Roman alphabet, using triangular or angular letters of lower case forms (French 1984:135).

In 1832, Samuel Gridley Howe used raised line letters at the Perkins Institute for the Blind in Watertown, Massachusetts. He later became known as the developer of the Boston Line Type, which was used in several American schools for learners who were blind. Dr. Howe's letters consisted entirely of lower case letters of angular type (Roberts 1986:9). In 1833, The Gospel According to Saint Mark was embossed in raised print at the Pennsylvania Institute for the Instruction of the Blind in Philadelphia. This gospel was the first book embossed in America for persons who were blind (Harley et al 1997:2).

The Boston Line Type was approved and recommended for use in schools for learners who are blind by the American Association of Instructors of the Blind in 1853.

In 1837, JH Frere of Black Heath, London used a phonetic system of stenographic and angular forms, which were sharply defined for touch. This raised line letter system became popular in Great Britain (Harley et al 1997:3).

In 1847, Dr William Moon of Brighton, England, devised a modified form of Frere's system based on regular type. Essentially, William Moon's system of reading consisted of raised type as an alternative to the other reading media in use (Dobree and Boulter 1982:124). Some of his forms were outlines of letters and some consisted of angles, half circles, and straight lines.

The Fishburne alphabet, using a system of both lines and dots, was developed for use by adventitiously blinded adults to label food and medicines (Harley et al 1997:3).

In 1860, a form of Braille was adopted for the first time in the United States at the Missouri School for the Blind. In 1868, William Wait, superintendent of the New York Institute for the Blind, tried to get the schools in Boston and Philadelphia to join him in adopting Braille. When they refused, he introduced New York Point, a dot system that used variable dot widths, resulting in overlapping of cells (Roberts 1986:10). In 1871, New York Point was endorsed and recommended for use in schools for children who were blind.

In 1878, Joel W. Smith introduced a modified Braille code at the Perkins Institute for the Blind. This modified American Braille system, modelled on the Braille system used in Great Britain, was the forerunner of the Braille system used in the United States in later years (Harley et al 1997:3).

(e) The battle of the dots

During the latter part of the 19th Century and the early part of the 20th Century, a battle, often referred to as the "battle of the dots" developed in America over the use of New York Point and the American Braille system. While most Mid-western and South Atlantic schools used the New York Point system embossed at the American Printing House for the Blind, most New England schools used the American Braille embossed at Howe

Press. Based on data from the 1910 census, persons who were blind in the United States were using five types of embossed print:

- New York Point
- American Braille
- English Braille
- Line Point
- Moon Type (Harley et al 1997:3).

With so many reading and writing media, persons who were blind were in a quandary. However, one of the major developments that helped popularize the use of Braille instead of New York Point was the development in 1892 of a mechanical Braille writer by Frank Hall, Superintendent of the Illinois Braille and Sight-Saving School (Roberts 1986:11). The BrailleWriter was basically an adaptation of the typewriter, with a moveable carriage and six keys separated in the middle by a space bar. This invention and his Braille stereotype machine did much to make Braille more popular, even though a counterpart was made for New York Point Braille by William Wait, Superintendent of the New York Institute for the Blind.

In 1950, the Howe Press at Perkins School for the Blind produced the Perkins Brailier, which was simpler and easier to operate.

In 1913, the American Association of Workers for the Blind Uniform Type Committee recommended Standard Dot Braille over either the American Braille or New York Point. Standard Dot was a system using the 3 x 2 cell but having fewer contractions than the British system. However, it was not until 1932 that there was a final agreement between England and the United States of America when the English Braille system was generally accepted.

Finally, in 1932, American and British committees signed an agreement to adopt Standard English Braille as the uniform type, a century after Louis Braille presented his code (Roberts 1986:10).

2.3 BLINDNESS

2.3.1 Introduction

Wilson (1982:1) captures an interesting moment in his life when he says: "I remember the first time I saw a blind man. He was standing outside a shop door, a blank listening face behind dark obliterating spectacles. My swift reaction, as a seeing child was a mixture of fear, pity, and a sense of strangeness. I have consciously preserved that memory. It has helped me to respect the anxiety of people who ask, not from curiosity, but from real fear "What would it be like if I went blind?" (Dobree & Boulter 1982:1).

For most people, the dominant role that vision plays in the performance of daily tasks is taken for granted. When sight is lost, the person feels particularly helpless and dependent until he is able to acquire appropriate adaptive behaviours and coping skills (Tuttle 1984:6). It is essentially because of the feeling of helplessness and dependence that blindness has been dreaded for centuries, being considered the most debilitating disability (Dobree & Boulter 1982; Koestler 1976; Kirtley 1975). Koestler (1976:1) states that "the deep and tangled roots of this fear have been fed through countless centuries, beginning in primeval days when early man, whose defence against his natural enemies depended largely on his ability to see and thus avoid them, felt most vulnerable in the absence of light."

In pursuing the idea of blindness being the most dreaded disability, Monbeck (1973:4) cautions that while blindness is undoubtedly a serious disability, "to consider it as the worst possible handicap, or as one so overwhelming that no one could endure it, is overstating the situation. Without denying the difficulties of being blind, however, blind people themselves do not consider it the worst possible disability."

From the foregoing, it is evident that a general lack of understanding of what blindness really is gives rise to speculation and stereotyping. It is hoped that the following discussion on blindness and issues pertaining to blindness will assist in providing a better understanding of what blindness really is.

2.3.2 What is blindness?

What is blindness "is a recondite and enigmatic question, as simple as it may appear and as ready as some answers to it may seem to be" (Lowenfeld 1983:221).

Based on the mistaken assumption that blindness is synonymous with darkness, it is not uncommon for people to either shut their eyes, or use sleep shades in order to try to simulate blindness. This is a gross misunderstanding of what blindness really is because apart from the obvious fact that by opening one's eyes or removing the sleep shades the darkness would be removed, the reality is that blindness is more than simply being in a state of darkness.

The fact that blindness cannot be simulated is reinforced by Tobin (1998:107) who argues that "it is difficult, if not impossible, for the sighted person to experience blindness. The essentially subjective nature of the condition can only be communicated by those who are themselves blind, and even then, we must acknowledge that each person's experience is unique." Equally important is that the experience of blindness is likely to be substantively different in some ways between those who are born blind, that is, congenitally blind, and those who become blind later in life, that is, adventitiously blinded.

According to Hollins (1989:2), there are multiple definitions of blindness, for much confusion has been caused in the past because there are degrees of blindness. There are those who are totally blind; there are those who have light perception, and are able to tell whether they are in a bright or dark environment, but cannot say, without turning their head, from which direction the light comes. Still others having light projection are able to indicate the source of light, for example, a window in an otherwise dark room, but are unable to distinguish details or shapes.

Focusing on the effects of blindness, Lowenfeld (1983:7) states that "blindness is a loss or serious impairment of vision that demands adjustment in order to reduce its handicapping effects. Education and rehabilitation are the most important means of adjustment. Their success, however, is basically dependent upon the strengths of each individual." Lowenfeld (1981:68) argues that blindness imposes three basic limitations on the individual:

- the range and variety of experiences;
- the ability to get about; and
- the control of the environment and the self in relation to it.

In speaking about persons who are blind, Best (1992:1) observes that we are concerned with a heterogeneous group of people who not only have a range of personalities, psychological make-up and interests, but also have a wide range of types and degree of visual impairment. However, for the lay person, the term blindness implies total loss of sight. It is no wonder then that members of the general public are puzzled by those persons, young and old, who use white canes, although apparently being able to "see." Still more confusing is the distinction between those who are partially sighted and those who are registered blind, as in most cases people who are blind seem to have some vision, and either group can use a long cane.

Adopting a holistic approach to blindness, Tuttle (1984:6) advises that while the medical component provides data regarding aetiology, diagnosis, prescription and prognosis, it is more important that the experience of blindness is described in terms of the interaction among these three factors:

- the needs and desires of an individual with little or no vision;
- the physical and social environment of an individual; and
- the common conception of blindness.

Dobree and Boulter (1982:113) emphasise that the attitude of the sighted towards persons who are blind might change if it were more fully understood that blindness can vary widely in degree. "Less than one in ten of those officially listed as blind live in a state of complete darkness. The majority remains able to perceive light and even large objects. So blindness may deprive its victims of sight, but not necessarily of light."

Clearly, while there are definitions of blindness, variations are introduced with regard to what blindness constitutes. For example, with regard to those who work with persons who are blind, the visual impairment denoted by the term "blindness" varies according to at least four variables:

- the degree of sight retained;
- the age of onset of blindness;
- the time elapsed since the onset of blindness; and
- the cause and nature of the onset of blindness (Lowenfeld 1983:221).

2.3.3 The onset of blindness

The experience of blindness is likely to be substantively different in some ways between those who are born blind, that is, congenitally blind, and those who become blind later in life, that is, adventitiously blinded (Tobin 1998:107). A further distinction is between those who experience gradual blindness, and those who become blind suddenly.

For Lowenfeld (1983:222) the age at onset of blindness is important because those who are congenitally blind, or those who become blind when they are younger than five years old, do not retain any valuable visual memory. This means that they must, either from birth or from early childhood, adjust to the world of the seeing, a world that is, in its visual aspects, not experientially known to them. Those who become blind later in life must adjust to the demands of the world of the seeing, which they have known and can more or less clearly remember. They also know what they have lost, and the emotional effect of their loss varies with their personality.

While Best (1992:3) also emphasises the importance of the age at onset of blindness, he maintains that if children lose their sight before the age of 5 years, "there is ample anecdotal evidence that some useful visual memory might remain. This is unlikely to be the case if vision is lost before the age of 18 months."

However, both Lowenfeld and Best concur that if the onset of blindness has occurred after 5 years of age, the child will almost certainly have some visual memory, which may help in imagining and understanding many concepts. In particular, it may be helpful in enabling the child to construct an image of the space around him, resulting in easier orientation and mobility than for the congenitally blind child.

With regard to those who experience gradual blindness, feelings of indecision and insecurity are predominant. As the person is not willing to accept the ophthalmologist prognosis, he or she may live in the hope that the situation would be short-lived, and that vision would be restored. Often, the medical practitioner cannot, and sometimes, will not confirm the prognosis with regard to the person's vision, thus causing a protracted state of fear, insecurity and anxiety. Notwithstanding this, Lowenfeld (1981:83) maintains that human nature with its inherent desire for self-preservation, is, in most cases, strong enough to recuperate and to begin adjustment. This is a slow

process, which develops as self-confidence is gradually regained, and the individual learns to recognise and live with his limitations and assets.

Referring to sudden blindness, Lowenfeld (1981:83) states that sudden blindness is invariably accompanied by shock. The newly blinded person may react to his/her blindness with all the preconceived ideas about it. Helplessness, tragedy, economic insecurity, inability to function as a man or woman, fear of darkness, all these supposed concomitants of blindness are experienced by him with the full force of identification. This shock causes withdrawal, extreme apathy, and suicidal ideas." The problem is compounded when some ophthalmologists and general practitioners are reluctant to reveal the true facts to the newly blinded person, thereby reducing the likelihood of full and effective adjustment (Dobree & Boulter 1982:114). An equally damaging situation can arise if the newly blinded person is unwilling to accept an unwelcome prognosis, often resulting in a lengthy, costly, and in most instances, a fruitless quest for a "miracle cure" (Dobree & Boulter 1982:114).

With specific reference to reading and writing, it is the inability to read and write as he/she did before that brings home to the newly-blinded person, perhaps more than any other factor, his/her need to rely more than ever before on the help of others. Some persons who are blind live with close family members or intimate friends with whom they are prepared to share every aspect of their lives. But many are not so fortunate, and blindness creates for them a situation in which few, if any, aspects of their personal lives can be completely confidential, as the contents of correspondence remain unread until transmitted to them by a third party (Dobree & Boulter 1982:118). This is also the case with writing personal letters, brief notes or messages. Until the person who is blind is able to communicate with other persons who are blind through Braille, electronic or audiotaped media, most of his/her contacts with others, except for those conducted face-to-face or by telephone, will require the participation of another individual, thereby relinquishing his/her privacy.

2.3.4 Terminology

Although the term *blindness* was explained briefly in chapter one, a more detailed explanation is provided in this section in order to obtain a clearer understanding of what blindness really is.

2.3.4.1 *Visual acuity*

According to Best (1992:2), the level of vision is usually expressed as a figure such as 6/6, which indicates the performance of the eye in relation to an average "good" eye, and is called visual acuity.

Charts for testing visual acuity are commercially available. The Snellen Eye Chart is the most commonly used chart to test distance vision, and is available in four types:

- printed with numbers
- printed with letters
- printed with pictures
- printed with E's in various positions.

The latter type of Snellen Chart is useful for testing children and those who are unable to read print letters. To facilitate this, the E's are positioned in different directions. The person being tested is then asked to position his/her fingers in the same direction as the E's in a particular line of the chart, that is, right, left, up, or down.

The well-illuminated chart is set up to measure a visual acuity at a distance of 6 meters. The retinal image depends upon both the size of the object and its distance from the eye. It is therefore also possible for the chart to be scaled down for use in a confined space. For example, if a projector is used, the person being tested may be sitting at a distance of 3 metres from the mirror, but the distance is doubled to 6 metres by the chart being reflected off a second mirror. This test will give the examiner a baseline of the client's central visual acuity. The 6 metres will be written as the numerator. The lines of the chart are numbered and are always expressed over the distance of 6 metres. This is however not a fraction. The person being tested is asked to read the line that can be seen most clearly. This line will be written as the denominator. Should the person being tested achieve a visual acuity of 6/18, it means that this person can see at 6 metres what someone with normal vision can see at 18 metres. The denominator, therefore varies. It also increases as the vision deteriorates, for example, 6/24, 6/36, 6/60, and 3/60.

If visual acuity cannot be tested using the Snellen Chart, the distance at which a person is able to count the number of fingers being shown is recorded. If the person is unable to count fingers, his/her ability to discern hand movements is determined.

A further variation is that a person may only have the ability to perceive light, commonly referred to as light perception. This may be ascertained by shining a pen light into each eye. The person is asked to say whether the light is on or off.

However, there may be instances where the person is only able to say where the light is being directed from as it is projected into the eye from different quadrants. This will be recorded as Light Perception with Projection.

At the furthest end of the scale, there may be those persons who have no light perception, that is, are totally blind. However, in South Africa, a person would be registered blind if he/she has a vision of 6/60 or less with correction in the better eye, or a visual field of no more than 20 degrees in the better eye (Pretoria Eye Institute 2001).

However, although visual acuity readings may serve as a guide, a critical factor that must be considered for all practical purposes is that individuals vary in terms of their ability to make functional use of their sight. Therefore, in speaking of blindness, it is important to remember that not all registered blind persons are totally blind, that is, having no sight. A large number of registered blind persons are able to distinguish between light and darkness, and, on entering a room, for example, are able to indicate the location of the window. Others again have limited fields of central or peripheral vision, so that they are only able to see objects and persons within a limited area.

2.3.4.2 Field of vision

A person's field of vision involves the use of both the central and peripheral vision. Full vision allows a person who is sighted to see horizontally over roughly 170 degrees, almost in line with each shoulder. However, with certain eye conditions, such as Retinitis Pigmentosa, an individual may only have central vision, with peripheral vision being absent, thus having a narrowed field of vision. Therefore, even if there is good visual acuity, the field of vision may be restricted to, for example, only central or peripheral vision. An assessment of the visual field can be made by qualified medical

personnel using a perimeter. The person being assessed is asked to indicate when he/she first sees a small point of light that is brought forward from behind him/her over the whole visual field of 360 degrees. The visual field can then be plotted for each eye and any deficiencies identified (Best 1992:14).

2.3.5 Misconceptions and stereotypes regarding blindness

Perhaps the observation of Keller (1928:147) provides a useful backdrop to the issue on the misconceptions about blindness. In expressing her apparent concern, Keller states that "a great deal has been said and written about the blind, and yet persons well informed on other matters display a medieval ignorance about those who cannot see. I have known intelligent people who believed that the sightless can tell colours by touch, and it is generally thought that they have one or more senses given them in place of the one they have lost, and that the senses, which of right belong to them, are more delicate and acute than the senses of other people."

Essentially, misconceptions and stereotypes pertaining to persons who are blind result from limited experience or interaction with them. However, Cohen (1972:19) maintains that sustained contact with people who are blind breaks down these stereotypes held by those who are sighted. Consequently, it is important to obtain an understanding of misconceptions surrounding blindness "because they are usually related to how the person who holds them views and relates to individuals who are blind" (Scholl 1986:23). Although there are several misconceptions and stereotypes with regard to blindness and persons who are blind, only those pertaining to reading and writing have been included.

2.3.5.1 Misconceptions with regard to the reading and writing media

With specific reference to a reading and writing medium, there is the misconception that all persons who are blind read and write through the medium of Braille. "Before going blind, I thought all blind people could read and write Braille, but the truth is that only one out of five is able to master it" (Minton 1974:53). Minton typifies the many who entertain this notion, based on an associated misconception that the sense of touch of persons who are blind in general is keener than that of their sighted counterparts. It is misconceptions and stereotypes such as these that lead people to impose limitations

on persons who are blind. For example, they may contend that since all persons who are blind ought to read and write through the medium of Braille, Braille should consequently be the only medium that is introduced to them.

2.3.5.2 Misconceptions with regard to the sense of touch and hearing

It is not uncommon to encounter the notion that the loss of sight brings with it certain compensations. These ideas are probably grounded in the belief that blindness is overwhelmingly catastrophic, and that there must certainly be some kind of compensation, as existence without sight would be absolutely impossible.

According to Carroll (1961:113), one of the commonest misconceptions about persons who are blind is that they are gifted with an exceptionally keen or "superhuman" sense of touch. Carroll emphasises that while the sense of touch is not automatically sharpened by blindness, it can be developed through training. Carroll further argues that the importance of the sense of touch for the person who is blind to obtain information, and for orientation and mobility, is second only to that of hearing.

Referring to the misconception with regard to acuteness of hearing, Koestler (1976:5) contends that people who are blind do not hear better than others, they merely learn to pay more attention to the auditory cues that sighted people can afford to ignore. Koestler emphasises that what most people continue to misunderstand is that both acuteness of hearing and sensitivity to touch in persons who are blind are not compensatory gifts of nature, but the products of long, hard concentration and training (Koestler 1976:3).

In an effort to dispel misconceptions relating to hearing and touch in persons who are blind, the following section will provide a discussion both on the development of listening and tactual skills, and motor and spatial development.

2.4 AUDITORY, TACTUAL, MOTOR AND SPATIAL DEVELOPMENT

2.4.1 Introduction

Vision, which is the main source of information for sighted persons, is a co-ordinating

sense, which enables the sighted person to be aware of near and distant objects and the relationships between them in position (Best 1992:15). The important role of vision as a major source of information is elaborated by Barraga (1986:87) who maintains that "a greater quantity of information is gained in a shorter period of time through use of the visual system than through any other single sense organ. The eye provides the brain with the sensations for the interpretation of colour, the dimensional quality of objects, the impression of distance, and the ability to follow an experienced movement while the body remains stationary. Often called the primary sensory channel for extension of the human being beyond her own body, vision is the mediator for other sensory impressions and acts as a stabiliser between the person and the external world."

In highlighting the role of vision in obtaining information, Carroll (1961:102) states that the eye receptor is capable of taking in and transmitting a vast amount of information at one time. The other channels are far more selective and less capable of carrying a great deal of information all at once. As a result, sight conveys by far the greater amount of all the sense information received, especially during the early learning years and in new situations. Hence, the sighted child instinctively organises the information furnished by the other senses mainly in reference to that conveyed by sight. The sense of sight is therefore not only the main source of information, but also the main censor or tester of all sense knowledge.

While no one sense can take the place of sight, all of them together can convey a great deal of varied information, providing a reasonably adequate knowledge of one's environment for ordinary purposes. Consequently, the child who is blind needs to develop much more than a single substitute for sight. Essentially, this would involve the development of listening and tactual skills, as well as spatial and motor development skills.

2.4.2 Listening skills

The development of listening skills is an important element in the education of all children. Teachers of children who are blind are aware that listening skills do not develop naturally, but need to be taught through systematic programmes of instruction (Mangold 1982:123).

Arter (1997a:143) observed that many children who are blind rely predominantly on

information they receive through their sense of hearing. They are expected to comprehend and assimilate information about their environment through sound, and therefore need to develop effective listening skills for a variety of applications.

The need for listening skills starts in infancy when sound localization enables children to explore their environment, and when sound interpretation helps them to understand object-sound relationships (Harley et al 1997:217). Listening activities include listening to recorded books and magazines, listening to teachers, speakers, and friends, and listening to television, radio, computers (with speech output), telephone, calculators, measurement instruments, and electronic devices with speech output.

The development of listening skills must precede tactual, motor and spatial development, as it is important to provide the child who is blind with information about his environment, so that when he is moving about, he can identify places by their characteristic sounds, for example, "the crunching of gravel on a driveway, the noise of a manhole cover being stepped on, the squeak of a door, the lapping of water, the croaking of frogs" (Carroll 1961:105). However, while the child who is blind needs to be exposed to auditory stimulation, training in auditory discrimination cannot be ignored.

In this regard, Barraga (1986:93) observes that because of the consistent uncontrollable emission of sounds into the environment, human beings have little control over auditory input until they can learn to mask sounds by selective listening and perception. To illustrate this, Arter (1997a:146) emphasises that in many homes, there is constant background noise where, for example, the radio, television, and compact disc player often compete for attention. To be able to determine which sounds have meaning is a difficult task without vision, and even more complicated when there is no body contact with the sound-producing object (Barraga 1986:93). Therefore, Arter (1997a:146) maintains that while it is important for the child who is blind to listen to the variety of sounds in his environment, of critical importance is that listening is not the same as hearing. The child may hear a sound without either understanding or comprehending it. Consequently, children who are blind need to be trained to listen selectively, to distinguish important sound information from superfluous background noises.

Essentially, training in auditory discrimination would involve the following:

- becoming aware of the sound;

- identifying the source of the sound;
- discriminating one sound from another; and
- attaching meaning to the sound.

In underscoring the importance of auditory discrimination, Carroll (1961:105) states that training should be given by repeatedly asking the blind person: "What was that sound?" and by giving him feedback to confirm his identifications and help him correct his mistakes.

The ability to determine where a sound is coming from is useful in locating oneself, even in a small room or apartment, and vitally important in mobility. Some writers (Best 1992:19, and Carroll 1961:105) recommend, for instance, that a ticking clock be part of the furnishings of the home of a person who is blind to provide a fixed and constant sound source by which he can always orient himself. The noise of a refrigerator, the squeaking of a floorboard, or the sound of a radio in a fixed position can serve the same purpose. Similarly, in moving outside the home, the child who is blind can learn to orient himself by recognising characteristic sounds, for example, the rustling branches of a particular tree, wind chimes in a verandah, the traffic from a nearby street, or chirping birds in the garden.

Highly developed listening skills can also help learners to access computers, electronic reading devices and talking calculators that use synthesized speech. In addition, in public examinations, some learners who are blind may use the services of an amanuensis (scribe). Consequently, it is essential that they are able to listen attentively, concentrate for extended periods of time, and work to deadlines.

2.4.3 Tactual development

It is widely accepted that the sense of touch is extremely important in the development of spatial organization in blind children (Best 1992; Lowenfeld 1981; Dobree & Boulter 1982; Mason and McCall 1997; Barraga 1986). Children who are blind need to feel confident if they are to develop a sense of security to explore their environment. The window to the world for young children who are blind is their sense of touch. Later, when they begin to read and write Braille, use the computer keyboard, or locate the

various buttons on an audiocassette, their sense of touch will be very important.

Children who are blind react with all their senses to the stimuli received from their environment. However, only through touch observation can they gain an actual knowledge of the objects surrounding them (Lowenfeld 1981:31). Additionally, an actual knowledge of the object world and its spatial characteristics can only be gained through concrete tactual observation. This of course is not always possible and therefore models of objects are an important teaching aid. If objects are too large the models represent them in a smaller form. On the other hand, if objects are too small, the models represent them in a larger form. Observation in reality is, however, preferable because a replica or model is always in some way incomplete or distorting, and children who are blind must be made to understand this.

Best (1992:21) emphasises that the three main factors to be considered when establishing the special tactual needs of children who are blind are:

- Without the use of the co-ordinating sense of vision, exploration will have to be provided through sequential experiences, which have to be synthesised into a whole. This is complex and takes more time than normal visual exploration.
- The features and characteristics that are of help and interest to a child exploring tactually may be different from those that are important to the sighted child.
- The quantity and quality of experiences will be restricted and this, in particular, will make incidental learning difficult.

Notwithstanding these limitations, of critical importance is the fact that the primary focus of tactual stimulation activities, particularly during the pre-school years, should ensure that children who are blind have the readiness preparation required for using touch as the primary learning sense. To this end, Barraga (1986:92) emphasises that during play, children who are blind should be provided with opportunities both to dismantle and assemble the parts of blocks, toys, and household objects. As a result, concepts of mental space and grouping of objects will be perceived.

With regard to the value of concrete experiences, Lowenfeld (1981:81) emphasises that "the teacher of blind children must understand that her learners need to become acquainted with objects and materials in their environment and that this acquaintance

should not be verbal, but the result of direct observation." Lowenfeld emphasises that it is not a question of enriching the child's vocabulary, but of giving him opportunities for observation, which will lend reality value to his environment. This will help him avoid falling into a pattern of unreality, which so often interferes with his later adjustment to the requirements of life.

In underscoring the importance of concrete experiences, Arter (1997b:101) suggests that the teacher should be aware that in all subject areas, concepts may not be fully grasped. Therefore, a hands-on approach, enabling the child to actually handle materials, is essential. By using tactual exploration, the children's understanding of the world about them will be increased. In addition, tactual exploration will also assist in learning Braille. This hands-on approach is important for most areas of the curriculum.

Admittedly, if the sense of touch could serve as well as the sense of sight, persons who are blind would not be at any particular disadvantage. However, tactual perception has distinct limitations as compared with visual perception as it requires direct contact with the object being observed. Understandably, certain objects cannot be tactually observed because they are inaccessible for direct contact. Examples of situations where tactual observation is not possible include the following:

- Some objects are too far away to be observed, for example, a ship in the distance
- Some objects are too high up to be touched, for example, clouds
- Some objects are so large that they cannot be observed tactually in toto, for example, mountains and large buildings
- Some objects are too small to be observed tactually with any degree of accuracy, for example, ants and lice
- Some objects may be fragile or tender, making tactual observation difficult, for example, butterflies and soap bubbles
- Some objects cannot be touched as they may be in motion, for example, a carousel
- Some objects may be too dangerous to be observed by touch, for example, fire or a spinning blade
- Some objects may not be available for tactual observation if they are locked in glass cases (Lowenfeld 1981:79)

Even when the child who is blind has the opportunity to tactually explore an object, this would have to be done by examining the elements of the object in a sequential manner. He will move his fingers from one part of the object to another, returning to check the relationship of parts and then trying to imagine how they must fit together (Best 1992:19).

However, for larger objects, such as a table or motorcar, this may be a complex task, and one that would require more time than a quick visual exploration.

Clearly, since only parts of some objects are accessible with reasonable ease, persons who are blind acquire only a partial knowledge of many objects. Thus, it will be understood that a great many experiences which are taken for granted with seeing children are either impossible or more difficult for children who are blind. This aspect is clearly articulated by Best (1992:20) when he observes that while both the sighted child and the child who is blind will be able to identify many objects and activities, in almost every situation, the quantity and quality of the information will be reduced for the child who is blind. Furthermore, there will be occasions when the information available will not be sufficient to enable the child to understand what is happening.

Referring specifically to difficulties experienced with tactile representations, Barraga (1986:92) maintains that "graphic representations in two-dimensional form are a high level of tactual perception, and the representations may have little resemblance to the three-dimensional object previously handled and now presented in a flat perspective." Barraga suggests that recognition and association can be fostered by beginning with simple structural patterns such as geometric forms, and gradually increasing to more complex drawings.

Using the experience of her own blind pre-school child's difficulties in identifying tactual representations, Miller (1985:6) clearly and succinctly underscores the serious limitation of tactual pictures. "What could a little piece of fur with four thin strips sticking out of the bottom and pasted on a page have to do with that warm, wiggling, panting mass of fur that she would know as a dog?"

It is evident that while the sense of touch is valuable in tactual exploration, it also has limitations. Notwithstanding this, teachers and parents must provide children who are

blind with opportunities for experiences, which they cannot gain on their own. However, the most important element in increasing the blind child's ability to gain experiences is his own ability to get about and secure stimulation by himself (Lowenfeld 1981:31). Such independent experiences would prepare him or her for the challenges of secondary education or employment.

2.4.4 Motor development, mobility and orientation

The restriction in the ability to move about independently is perhaps the most serious direct effect of blindness. According to Best (1992:17), motor development, which includes the elements of movement and orientation, is of particular importance in the developmental process of children who are blind. In pursuing this idea, Lowenfeld (1981:80) maintains that in the comparatively sheltered life of either the parental home or a residential school, the restriction in mobility does not make itself fully felt. However, when the child grows up, he also grows out of his environment and is confronted with the task of adjustment to the wider world. Then his restriction in mobility becomes a factor of major importance and carries new implications. For instance, the youngster who is transferred from a residential school to a public high school, or graduates from the residential school, must now pursue his activities in a changed and more complex environment. If he has not been encouraged and taught to develop his ability to move about and has not achieved a reasonable independence in it, his whole success may be jeopardised.

Kingsley (1997:28) recommended that in order to develop as confident and independent travellers, children who are blind will need skilled intervention from a very early age to promote motor development and co-ordinated and purposeful movement, and, as they develop, a carefully structured programme to teach them the techniques of independent travel.

Clearly, independent travel in the case of persons who are blind involves both orientation and mobility (Scholl 1986:315). While orientation is the ability to understand surroundings through an awareness of space and spatial relationships between objects and people in the environment, mobility refers to the ability to travel through the surroundings (Best 1992:156).

Stated simply, while orientation refers to the creation of a mental map or pattern of the environment, mobility includes the set of skills and techniques which enable a person who is blind to travel more easily through his environment. With specific reference to children who are blind, the term "mobility" is used here to describe the motor skills needed in order to reach, crawl, walk or run.

"The development of skills in orientation and mobility is inextricably linked to the early development of movement" (Kingsley 1997:28). While early training in mobility and orientation may be provided by parents or educators, advanced skills to enable persons who are blind to travel safely and independently around their neighbourhood using long cane techniques is usually given by qualified rehabilitation officers.

2.4.5 Spatial development

According to Wheeler, Floyd, & Griffin (1997:177) children who are blind often experience problems in spatial organisation because a lack of interaction with objects gives them fragmented information about the objects, and frequently affects the critical components of spatial organization, which includes motor exploration, tactual development, and spatial representation. Wheeler et al emphasise that the development of spatial organization in blind children is critical. By using spatial organization, motor exploration and touch, children who are blind can orient themselves in space as well as interact with others in the environment.

This idea is further explored by Barraga (1986:93) who maintains that "mental space is actually constructed as movements and actions are co-ordinated and internalised when exploratory and movement opportunities are provided consistently." Essentially, this means that spatial perceptions can be confirmed by mental mapping of position of objects encountered along certain routes, and by using touch as a guiding support to movement in confined areas.

With specific reference to children at an early age, Best (1992:159) observes that particularly up to the age of 8, moving around requires an understanding of positional or spatial concepts such as in front of, behind, here, above. Children also need to understand comparative concepts such as nearer and further. Children cannot walk to somebody in front of them unless they understand what "in front of" means in any specific situation.

An important aspect in the development of spatial awareness is that the child who is blind must feel comfortable and safe in his immediate environment. Exploring this idea, Stone (1997:90) suggests that the arrangement of rooms needs to be kept unchanged, at least when the children first begin to move. Children who are blind have to rely on things being where they anticipate them to be, otherwise the spatial map that is being built up loses consistency, and they may become confused and discouraged.

From the discussions on the importance of auditory, tactual, motor and spatial development, it is evident that children who are blind would not be able to adequately meet the challenges of reading and writing in the context of education and employment, unless they have good listening and tactual skills, accompanied by sound motor and spatial development.

2.5 CHALLENGES IN EDUCATION FOR PERSONS WHO ARE BLIND

2.5.1 Transformation of educational provision for learners with disabilities, including learners who are blind

The Constitution of South Africa issues a special challenge to give effect to the fundamental right to basic education for all South Africans, and calls for equality and non-discrimination. The Government's commitment to the central principles of the Constitution are guided by the recognition that a new unified education and training system must be based on equity, on redressing past imbalances, and on a progressive and significant qualitative improvement of education and training.

White Paper on an Integrated National Disability Strategy (South Africa 1997:35) estimates that almost 70 percent of children with disabilities of school-going age are presently out of the school system. This naturally results in illiteracy and low skills among adults with disabilities, contributing significantly to high levels of unemployment. As persons who are blind fall within the category of disability, it would be logical to infer that a significant number of persons who are blind are also out of the education system.

It is no wonder then that in October 1996, the Ministry of Education in South Africa appointed both the National Commission on Special Needs in Education and Training,

and the National Committee on Education Support Services to investigate and make recommendations on all aspects of special needs and support services in education and training in South Africa.

A joint report on the findings of these two bodies was presented to the Minister of Education in November 1997, with the final report being published by the Department of Education in February 1998 for public comment and advice (South Africa 2001:15).

Based on extensive investigations and broad consultations with relevant roleplayers, the central findings of the National Commission on Special Needs in Education and Training, and the National Committee on Education Support Services, included the following:

- Specialised education and support have predominantly been provided for a small percentage of learners with disabilities, within special schools and classes
- Specialised education and support were provided on a racial basis, with the best human, physical and material resources being reserved for Whites
- Most learners with disabilities have either fallen outside of the system, or been mainstreamed by default
- The curriculum and education system as a whole have generally failed to respond to the diverse needs of the learner population, resulting in a significant number of drop-outs, push-outs and failures
- While some attention has been given to the schooling phase with regard to special needs and support, the other bands of education have been seriously neglected (South Africa 2001:5).

In the light of these findings, the report recommended that "the education and training system should promote education for all, and foster the development of inclusive and supportive centres of learning that would enable all learners to participate actively in the education process, so that they would develop and extend their potential and participate as equal members of society" (South Africa 2001:5).

Based largely on the recommendations contained in the comprehensive report, the Education Ministry released Education White Paper 6: Special Needs Education - Building an Inclusive Education and Training System in July 2001, thus laying a solid foundation for the introduction of an inclusive education and training system in South

Africa.

2.5.2 Explaining inclusive education and training

2.5.2.1 Introduction

At the heart of any institution is the learning site community, comprising various stakeholders, including learners, educators and community members. The various stakeholders bring to the community their unique knowledge, skills and characteristics, as well as beliefs and values based on their cultures. They interact and participate within the context of the common task of teaching and learning. Inclusive education and training is therefore the framework that aims at ensuring that all stakeholders can participate in a meaningful way in this common task, contribute in different ways, and be valued and respected as equal members of the community of the educational institution (South Africa 2002:48).

As a catalyst for change, inclusive education and training provides not only for institutional improvement, but also for an increased awareness of human rights, and a reduction in discrimination. Essentially, inclusive education and training involves changes in attitudes, behaviour and ways of working, and has the potential to make an effective starting point to address the rights of learners in a range of cultures and contexts (South Africa 2002:48). Holdsworth and Kay (1995:4) maintain that inclusive education incorporates the principle of access for all disadvantaged learners, and not merely for those with disabilities. Inclusive education is therefore a shift from disability-specific theories, assumptions, practices and models, to a non-disability-specific inclusive system of education. Consequently, teaching and learning will become more effective and relevant, meeting the needs of all learners, including those with disabilities.

According to Voltz, Brazil and Ford (2001:2), "the concept of inclusion, like the concept of freedom, is intangible, sometimes elusive, and often subject to divergent interpretations." Voltz et al (2001:2) argue that inclusion does not refer to a physical space, but rather to a condition or state of being. The concept of inclusion implies a sense of belonging and acceptance. Hence, inclusion has more to do with how educators respond to individual differences than it has to do with specific instructional configurations.

The physical placement of learners with disabilities in general education classes is often over-emphasised, while other aspects of developing inclusive environments are neglected. For example, this can occur in instances in which the goal of inclusion is viewed merely as the placement of learners with disabilities in general education classrooms, as opposed to the creation of instructional environments that promote educational success and a sense of belonging for all learners.

2.5.2.2 Principles underpinning inclusive education and training

Education White Paper 6 (South Africa 2001:19) highlights several important principles of inclusive education, which may be summarised as follows:

- Acknowledging that all children and youth can learn, and that all children and youth need support
- Accepting and respecting that all learners are different in some ways, and have different but equally valued learning needs
- Capacitating education structures, systems and learning methodologies to meet the needs of all learners
- Acknowledging and respecting differences among learners, whether due to age, gender, ethnicity, language, class, disability, HIV or other infectious diseases
- Acknowledging that learning is broader than formal schooling, and may also occur in the home and community, and within formal and informal modes and structures
- Changing attitudes, behaviour, teaching methodologies, curricula and the environment to meet the needs of all learners
- Maximising the participation of all learners in the culture and curricula of educational institutions
- Uncovering and minimising barriers to learning
- Empowering learners to participate critically in the process of learning by developing their individual strengths

2.5.2.3 Shifts in policy for an inclusive education and training system in South Africa

Education White Paper 6 (South Africa 2001:25) outlines the following shifts in policy for

an inclusive education and training system in South Africa:

- Systematically move away from using segregation according to categories of disabilities as an organising principle for institutions
- Base the provision of education for learners with disabilities on the intensity of support needed to overcome the debilitating impact of those disabilities
- Place emphasis on supporting learners through full-service schools that will have a bias towards particular disabilities, depending on need and support
- Direct how the initial facilities will be set up, and how the additional resources required will be accessed
- Indicate how learners with disabilities will be identified, assessed and incorporated into special, full-service and ordinary schools in an incremental manner

- Introduce strategies and interventions that will assist educators to cope with a diversity of learning and teaching needs to ensure that temporary learning difficulties are improved
- Give direction for the Education Support System needed
- Provide clear signals on how current special schools will serve identified disabled learners on site, and also serve as a resource to educators and schools in the area.

A notable feature of the proposed education and training system as articulated in Education White Paper 6 is that a broader range of educational support services would

be created in response to what learners with disabilities (including learners who are blind) require, and not what the system thinks they should receive.

In terms of this model, learners who require low-intensive support will receive this in ordinary schools, and those requiring moderate support will receive this in full-service schools. Learners who require high-intensive educational support will continue to receive such support in special schools (South Africa 2001:37).

2.5.3 Major issues in the education of persons who are blind

Major issues that vex the education of learners who are blind include the following:

- A lack of understanding of blindness and blindness issues
- The long-drawn debate on special schools versus inclusive education
- An inflexible curriculum
- Learning Materials in alternative formats
- Perceived difficulties with the Braille code
- The high cost of adaptive technology
- Inadequate training of instructors to teach learners who are blind to use the different reading and writing media
- The non-recognition and non-involvement of parents (South Africa 2001:43).

2.5.3.1 A lack of understanding of blindness and blindness issues

As this aspect has been discussed in detail under 2.3, only brief reference will be made to it here.

Dobree and Boulter (1982:14) maintain that misunderstandings about the nature of blindness often originate as a result of a lack of knowledge concerning the point at which declining sight is recognised as such in medical terms, legislative provision, or eligibility for supportive services. These misunderstandings often result in persons who are blind being viewed as a homogeneous group of persons who think and function alike. This lack of understanding has given rise to major misconceptions, the cumulative effect of which has been to either exaggerate or downplay the competencies and potential of persons who are blind.

With specific reference to the context of education, the lack of understanding about blindness may result in persons who are blind not receiving the educational support they require as persons who have individual needs. Since persons who are blind are often viewed as a homogeneous group, the same type of support may be provided. For example, believing that all learners who are blind read Braille, study material may be provided in this format to all learners who are blind.

2.5.3.2 Special schools versus inclusive education

The issue of special schools versus inclusive education has been the focus of debates in many countries, with convincing arguments being presented on both sides.

With specific reference to learners who are blind, proponents of special schools argued that special schools provided special education, and that educators in special schools were equipped to meet the special needs of learners who were blind. However, those in favour of inclusive education believed that learners who were blind would derive greater benefit from inclusive education as they would not be seen as being different from their sighted peers. Equally important, they maintained that parents should have the right to send their children to the school of their choice, preferably in the city, town or village in which they lived.

According to Bina (1997:197), the debate regarding special schools or inclusive education reached its peak in the mid 1970's, and subsided in the early 1990's. Then, when the full-inclusion pressures threatened both the public school and specialised residential school services for children who are blind, those previously on opposite sides of the issue united against this external threat.

Persons involved in the field of blindness accepted that both the public school and the specialised school were critically needed, depending on the individual needs of the children. Educators soon realised that without a full continuum of placement options, learners cannot gain the skills they need to be as successful as they can be.

Today, more than ever, there is the growing view that the choice must be based on what would be in the best interest of learners. Equally important is the issue of whether there is necessary support, and whether the system as a whole is willing to accommodate the needs of learners.

Expressing deep concern, Spungin (1997:1) states that during the past few years, specialised schools for learners who are blind in Arkansas, Illinois, Iowa, Maryland, and New Mexico, have been threatened. This threat, according to Feldman (2003:34), also impacted on the Kentucky School for the Blind. Feldman reported that a broad spectrum of the blind community throughout the Commonwealth of Kentucky protested

against the threatened closure of the school, which, founded in 1842, is the third-oldest school for learners who are blind in the United States of America.

As an ardent proponent of special schools, Spungin (1997:1) argues that in the United States, the cost of educating learners at specialised schools is fairly constant among the various states, and it should not be surprising that the cost per learner appears to be exorbitant. However, when the amount of intensive instructional time provided by these schools, and the variety of opportunities available to learners to enhance their education is considered, the investment is well worth the cost. If a learner who has intensive needs in Braille, orientation and mobility or independent living skills is placed in a local district to receive an hour of instruction per week from a teacher of learners who are blind, the outcome will be a learner who is ill-prepared for life.

Convinced of the principle of a continuum of placement options for all learners, Spungin (1996:271) argues that the movement that poses the greatest threat, both to the education of children who are blind and to Braille literacy, is "full inclusion." Spungin states that full inclusion advocates that all learners with disabilities must receive all their instruction in regular public school classrooms, thus leaving many learners who need alternative instructional environments, teaching strategies, or materials, at a disadvantage.

In attempting to qualify her position on special schools, Spungin (1997:1) indicates that what seems to be lost as we look at the ongoing argument about the legitimate place of specialised schools for learners who are blind is the fact that these schools do not function only as residential schools. Considered as the hub of educational services throughout the state, these schools provide resources and outreach programmes to public schools, research centres, demonstration schools, specialised curriculum production facilities, short-term placements, low-vision clinics, diagnostic centres, teacher education practice sites, Summer school programmes, and centres for professional development. When these schools are viewed as the state-wide service to all children who are visually impaired, the cost per learner becomes lower and more realistic.

Recognising the role and importance of specialised schools, Spungin maintains that

"the profession of visual impairment is committed to a continuum of placement options for all students. This position has been supported and endorsed by every professional organisation serving blind or visually impaired persons, every organisation of parents of visually impaired children, and every consumer organisation of visually impaired persons. On this one issue more than any other there is unanimity in the field that we must maintain specialised schools for visually impaired students" (Spungin 1997:1).

However, despite Spungin's claims, unanimity with regard to the continuation of specialised schools is not a given. For example, in South Africa, while there is strong support for the continuation of special schools as they had existed in the past, there is an equally strong move towards inclusive educational settings in which strengthened special schools/resource centres, and mainstream and full-service schools, would be an integral part.

According to Education White Paper 6 (South Africa 2001:45), in mainstream education settings, priorities will include multi-level classroom instruction, so that educators would prepare lessons with variations that would reflect, inter alia, individual learner needs, co-operative learning, and curriculum enrichment.

Special schools/resource centres will be integrated into district support teams so that they would be able to provide specialised professional support in curriculum, assessment and instruction to neighbouring schools. A critical function of special schools will focus on new approaches that emphasise problem solving and the development of learners' strengths and competencies, rather than focusing on their shortcomings only (South Africa 2001:45).

In full-service schools, priorities will include orientation to and training in new roles, focusing on multi-level classroom instruction, co-operative learning, problem solving and the development of learners' strengths and competencies, rather than focusing on their shortcomings only (South Africa 2001:45).

The shift from continuing traditional special schools to the new inclusive model is based

on the Education Ministry's view that "the prevailing situation in special schools and settings and in remedial classes and programmes is inappropriate, and in general, fails to provide a cost-effective and comprehensive learning experience for participating learners" (South Africa 2001:45).

2.5.3.3 *An inflexible curriculum*

According to the ANC Education Document (1994), as quoted by the draft discussion document of the National Curriculum Framework for the Further Education and Training Band (South Africa 1999:4), the term "curriculum" refers to all of the teaching and learning opportunities that take place in learning institutions. It includes the aims and objectives of the education system, the content taught, the skills imparted, strategies of teaching and learning, forms of assessment and evaluation, how the curriculum is serviced and resourced, and how it reflects the needs and interests of those it serves. In other words, curriculum is concerned with what institutions teach, and with what, how and under what condition learners learn.

Best (1992:102) maintains that "children with visual impairments are primarily children. They have a multitude of aspirations, interests and abilities, which are only partly determined by their visual problems. Their educational needs are similar to those of other children. They need access to a full curriculum, although their sensory impairments will create some additional needs that will require an additional special curriculum." This idea is supported by Arter (1997b:101) who argues that the aims of education for the child with a visual impairment should be the same as those for any other child, with full entitlement and access to a broad and balanced curriculum. However, to achieve these aims, some modifications and adaptations to the mainstream curriculum may be necessary.

In calling for an additional special curriculum, Best (1992:102) poses two fundamental questions:

- What extra subjects may children need to be taught?
- What special skills may a child need to acquire?

Best (1992:102) suggests that the child who is totally blind will need to develop tactile

skills and learn to read and write in Braille. All children with visual impairments will need to develop listening skills for use in the classroom and in mobility so that they can concentrate on, and interpret, important sound information. Some children will need help in developing movement, mobility and orientation skills. Some children may need daily living and social skills, for example, dressing, cooking, and using facial expressions. These may have to be learnt when lack of vision prevents them being acquired incidentally.

Admittedly, one of the most significant barriers to learning for learners in special and ordinary schools is the curriculum. Barriers to learning arise from the various interlocking aspects of the curriculum, which include the following:

- The content of learning programmes;
- The language/medium of teaching and learning;
- The management, organisation and infrastructure of the learning environment;
- The methods, processes and pace of teaching and learning;
- Timeframes for the completion of curricula;
- The learning materials and equipment used; and,
- Assessment methods and techniques (South Africa 2001:47).

Consequently, barriers within the curriculum must be identified and addressed, so that the curriculum is accessible to and relevant for all learners, irrespective of their learning needs.

An integral feature of the curriculum for learners who are blind should be training in the use of the various reading and writing media, so that they would be able to use the medium that best meets their needs and circumstances.

2.5.3.4 Learning materials in alternative formats

It is axiomatic that learners who are blind would derive greater benefit if they are active participants in the teaching and learning process. This would, to a large extent, be achieved if they are provided with learning materials in alternative formats that meet their individual needs. Materials in alternative formats may range from Braille to audiotaped and electronic formats. In addition, the teaching/learning process would be

greatly enhanced if learners who are blind have access to equipment, such as Braillewriters, audiocassette recorders, computers and/or notetakers with speech output.

Regrettably, in many educational institutions, a one-size-fits-all approach is used, providing learners who are blind with materials in Braille, rather than making materials available in alternative formats, and allowing learners to choose the format that best meets their individual needs. Also, learners may choose to use different media in different circumstances. For example, they may choose audiotaped material if they need to read while travelling, or opt for Braille material when reading difficult texts. On the other hand, a computer with speech output may be used when creating a document, as it would lend itself to text manipulation, spellchecking, and copying and pasting.

2.5.3.5 Perceived difficulties with the Braille code

The view that Braille is a difficult reading and writing medium is fairly common, with the most popular argument being that the Braille code is far too complex (Harley 1979; Castellano and Kosman 1997). This invariably refers to the use of contracted Braille, and the difficulties that it is reported to cause. A detailed discussion on this aspect is included in chapter 3.

2.5.3.6 The high cost of assistive devices and adaptive technology

In today's information age, electronic equipment that provides access to both the personal computer and the printed word, is highly sought after, having significant implications for all aspects of independent functioning. Assistive technology in particular is recognised as a key to independence for persons who are blind, as it provides them with access to mainstream society. However, as stated by Uslan (1992:406), "accompanying the great promise of technology is the equally great challenge -- getting the equipment into the hands of the disabled people who need it."

According to Uslan (1992:406), the term assistive technology refers to a wide range of devices that persons with disabilities use in education, employment, or independent living. Essentially, assistive devices refer to equipment or adaptations to equipment that

facilitate learning and the independence of learners.

With specific reference to accessing computers and print documents, Uslan (1992:406) identifies the following basic types of electronic devices:

- Devices that magnify screen images through specialised hardware or software
- Personal computer screen-access systems that incorporate synthetic speech software and hardware synthesizers
- Tactile output devices that provide hard-copy Braille, such as Braille printers, or paperless Braille systems that provide a line-by-line display of the computer screen
- Portable Braille notetakers that enable the user to input information through a Braille keyboard and save it for either playback via an internal speech synthesizer, or transmission to a personal computer or Braille printer
- Optical character recognition (OCR) systems that enable the user to scan and read printed documents via synthetic speech and then to send them to the PC for storage, editing, or printing.

White Paper on an Integrated National Disability Strategy (South Africa 1997:27) emphasises that access to appropriate and affordable assistive devices is essential for people with disabilities to exercise their rights and responsibilities, and to participate as equal citizens in society and learning. Without access to these devices, people with disabilities would continue to experience great difficulties in securing their rights to education and employment, and to participate in social and cultural activities. Undeniably, access to assistive devices must be accompanied by appropriate training in the use of the devices. Learners who are blind must be taught systematically to use the computer in conjunction with screen access technology, so that they would be able to independently or with minimal support, navigate the screen, generate and read documents, access their e-mail, and surf the internet.

However, while the advantages of adaptive technology are generally recognised, these cannot be obtained as they are comparatively expensive and beyond the means of the average person who is blind. The result is that learners are limited to the reading and writing media they can afford rather than the media they would be able to use.

2.5.3.7 Training of instructors to teach persons who are blind to use the different reading and writing media

Traditionally, schools for learners who are blind have provided instruction in the use of Braille to learners who are blind. However, as Braille instructors are often ill-equipped to teach Braille, learners who are blind receive inadequate training in reading and writing Braille. In emphasising the inadequacy of some instructors to teach Braille, Spungin (1996:374) maintains that "people do not like to do what they do not know how to do."

Although some instruction is provided in computer literacy to learners who are blind, it is often inadequate to enable them to use computers effectively as a reading and writing medium. Additionally, even when educators are skilled in the use of computers, they are unable to impart these skills to learners who are blind, as they are unable to train them in the use of speech access technology. To illustrate this, the data from a survey conducted in Kentucky, USA on 72 educators of learners with visual impairments indicated that only 51% of the respondents felt competent teaching their learners to use computer technology (Abner and Lahm 2002:111).

2.5.3.8 The role of parents in the education and training system

The pivotal role of parents in any education and training system cannot be overlooked, as parents are equal partners in the education of their children. In recognition of this fundamental educational principle, the importance of establishing effective partnerships with parents and parent organisations is often emphasised, primarily because they would be able to participate more actively and meaningfully in the education of their children.

With reference to the use of reading and writing media, the role of parents in encouraging children who are blind to use available media is crucial. Equally important is the need to be directly involved in the reading and writing activities of the child who is blind.

2.6 CHALLENGES FACED BY BLIND PERSONS IN EMPLOYMENT

2.6.1 The world of work

It is generally accepted that obtaining and maintaining employment is a benchmark of adult status and self-esteem. For most people, work is a defining feature of human existence, and the means to meeting basic needs. Work is an activity through which individuals affirm their own identity, both to themselves and to those around them. Furthermore, it is crucial for the welfare of families and the stability of societies.

In an extremely competitive and hostile employment environment, persons who are blind are viewed as unproductive, uncompetitive and burdensome. Yet for most adults, work or employment is a fundamental component of life, which confers status, economic security and opens up social networks.

Article 23 of the Universal Declaration of Human Rights, as cited by O'Reilly (2003:7) states that "everyone has the right to work, to free choice of employment, to just and favourable conditions of work and to protection against unemployment."

While this is a noble goal, the reality is that the rate of unemployment is generally high, resulting in poverty and suffering for millions of people throughout the world.

Unquestionably, for people with disabilities in particular, the situation is worse, as unemployment is compounded by negative attitudes to disability. Houtenville (2003:133) asserts that employment is one of the major social roles that people perform during their lives. To this end, "the inclusion of persons with disabilities in the world of employment is crucial to their social integration and economic independence." Consequently, for people with disabilities, full-time employment is a cherished goal, and one which may be attained only by overcoming various barriers.

In order to fully understand the difficulties experienced by persons who are blind with regard to employment, it is necessary to examine the situation for persons with disabilities in general, as persons who are blind are an integral part of the disability sector.

According to the White Paper on an Integrated National Disability Strategy (South Africa 1997:40), unemployment remains a fundamental problem affecting the majority of

people with disabilities. In an effort to address the employment issues of persons with disabilities, various initiatives have been introduced both nationally and internationally.

In rule 7 of the United Nations Standard Rules on the Equalisation of Opportunities for Persons With Disabilities (1994:38), countries throughout the world are urged to recognise the principle that persons with disabilities must be empowered to exercise their human rights, particularly in the field of employment. Furthermore, in both rural and urban areas, they must have equal opportunities for productive and gainful employment in the labour market.

To give effect to the principles underpinning the issue of employment for persons with disabilities, rule 7 of the UN Standard Rules on the Equalisation of Opportunities for Persons With Disabilities (1994:39) recommends that the action programmes of all countries should include the following:

- Measures to design and adapt workplaces and work premises in such a way that they become accessible to persons with different disabilities.
- Support for the use of new technologies and the development and production of assistive devices, tools and equipment, and measures to facilitate access to such devices and equipment for persons with disabilities to enable them to gain and maintain employment.
- Provision of appropriate training and placement, and ongoing support, such as personal assistance and interpreter services.

At a national level, White Paper on an Integrated National Disability Strategy (South Africa 1997:2-3), which provides recommendations to address the employment needs of persons with disabilities, maintains that the extremely high levels of unemployment among people with disabilities may be attributed to several factors, notably the following:

- Low skills levels due to inadequate education
- Discriminatory attitudes and practices by employers
- Past discriminatory and ineffective labour legislation
- Lack of enabling mechanisms to promote employment opportunities
- Inaccessible public transport
- Inaccessible and unsupportive work environments

- Inadequate provision of vocational rehabilitation and training
- Inadequate access to information.

The introduction of current labour legislation in South Africa is aimed at significantly reducing major obstacles for persons with disabilities. For example, the Code of Good Practice: Key Aspects on the Employment of People with Disabilities (South Africa 2002:3), which accepts that "disability is a natural part of the human experience, and in no way diminishes the rights of individuals to belong and contribute to the labour market." It asserts that when opportunities and reasonable accommodation are provided, people with disabilities can contribute valuable skills and abilities to every workplace, thereby contributing to the economy of our society.

Section 1 of the Employment Equity Act (South Africa 1998:7) defines reasonable accommodation as "any modification or adjustment to a job or to the working environment that will enable a person from a designated group to have reasonable access to or participate or advance in employment."

The Code of Good Practice: Key Aspects on the Employment of People with Disabilities (South Africa 2002:7) provides guidelines on what reasonable accommodation should include. However, for the purposes of this study, these guidelines have been contextualised for persons who are blind. Essentially, these guidelines include the following:

- Adapting existing facilities to make them accessible, for example, Braille markings and voice output in lifts
- Adapting existing equipment, or acquiring new equipment, including computer hardware and software with speech output or refreshable Braille displays
- Reorganising workstations
- Changing training and assessment materials and systems to make them accessible
- Restructuring jobs so that non-essential functions are reassigned
- Adjusting working time and leave
- Providing specialised supervision, training and support in the workplace.

2.6.2 Disability equity in the South African Public Service

According to the Report on Disability Equity in the South African Public Service (2002:iv), the Public Service Commission's investigation of 1999 into the State of Representativeness in the Public Service found that a mere 915 persons with disabilities were employed in the public service at that stage. Subsequently, concerned about the slow progress in achieving disability equity, the Public Service Commission initiated an investigation on disability equity in the South African Public Service as a comprehensive assessment of the progress that has been made with regards to disability equity in the South African public service, and a proactive attempt to assist departments in meeting the 2005 Target.

The data collected from the investigation reflects the situation for all-national departments and provincial administrations as at September 2001.

Based on information submitted by national departments and provincial administrations in respect of the 797750 employees in the public service, it was found that there were 2007 people with disabilities. This represents an average of 0,25%, which is far short of the 2% that needs to be achieved by 2005. The data indicated that people with disabilities occupied the most junior levels within departments, with more than 50% being employed between levels 1-5, and 40% employed between levels 6-9. From the management level, the representation drops sharply, with 5,9% at levels 10-12, 1,3% at levels 13-14, and 0,08% for senior management levels 15-16. The employment of people with disabilities was confined to low levels, involving little decision-making and authority. Males with disabilities were more represented than their female counterparts at higher levels, with African women with disabilities being at the lowest ranks (Public Service Commission 2002:iv).

The investigation revealed that while 20% of the national departments had a specific policy on disability, none of the provincial administrations were in possession of any policy. Furthermore, 26% of the national departments and 45% of the provincial administrations use the Employment Equity Plans as guides for ensuring disability equity in the workplace. A number of departments and provincial administrations, however, indicated that specific policies on disability were either in the process of being developed, or were in draft form (Public Service Commission 2002:iv).

The report also indicated that although training opportunities are provided across the public service, these tend to be of a generalised nature, are often not needs based, and are of limited use for developing particular skills required to make people with disabilities attain their true potential.

In the foreword to the report, Professor Sangweni, Chairperson of the Public Service Commission, stated that although there are variations in performance between and within national departments and provincial administrations, the overall picture calls for urgent intervention by policy makers and implementers alike. He stressed that increasing the representativeness of people with disabilities in the public service is not an end in itself, but should be accompanied by genuine empowerment. Moreover, it is also about giving effect to some of our constitutional ideals. "If we talk about South African society as being one that promotes diversity, embraces difference, and that is also caring and nurturing, it is important that such values are reflected in the workplace" (Public Service Commission 2002:iii).

Unfortunately, although the report of the Public Service Commission provides data on the employment of people with disabilities in the Public Service, a breakdown of the different disabilities is not captured. Consequently, data on the number of persons who are blind employed in the Public Service is not available. This would have been valuable information, as it would provide specific information that could impact on skills development training for employees who are blind.

2.6.3 The employment of persons who are blind

According to Ryder and Kawalec (1995:107), although many employment-minded individuals experience difficulty in obtaining employment, persons who are blind are presented with the most formidable challenges. Therefore, education and rehabilitation agencies need to provide persons who are blind with training in general employability skills, coupled with assistance in developing their career options. Undoubtedly, in a competitive economic environment, employers want employees who can do the job, lighten the workload, solve problems, and remove obstacles. However, largely as a result of a lack of awareness, employers often assume that applicants who are blind will have the opposite effect.

Given the stereotypical attitudes of many employers, persons who are blind often experience difficulties in obtaining and/or maintaining employment. The logical question is what factors are responsible for this situation?

2.6.4 Barriers to employment

In their study of the perceived employment barriers of 20 unemployed legally blind adults, O'Day (1999:627) identified personal, societal and programmatic barriers as being responsible for hampering persons who are blind in their efforts to secure employment. The study also found that some participants were actively seeking work, some were resigned to their unemployment, and others were looking for work but losing hope.

The following is therefore a brief discussion on major personal, societal and programmatic barriers, which hamper persons who are blind in their efforts to secure employment.

2.6.4.1 Personal barriers

Personal barriers include, but are not limited to the following:

- Deficits in skills or education
- Lack of work experience
- Lack of motivation
- Lack of job preparation skills
- Deficits in social interaction skills.

(a) Deficits in skills or education

The White Paper on an Integrated National Disability Strategy (South Africa 1997:35) asserts that education has traditionally concentrated on years spent at school, and, to a lesser degree, on tertiary education. It maintains that as links with the world of work and training have generally been weak, changes in educational policy are of particular importance to the future economic empowerment of people with disabilities.

(b) Lack of work experience

Although many persons who are blind receive training in preparation for possible employment, the lack of work experience often poses a problem in terms of securing employment. When deciding on a candidate for a position, employers usually prefer someone who has relevant experience. Therefore, Ryder and Kawalec (1995:107) recommend that although competitive employment is the ultimate goal, "those who have not found jobs should keep their skills fresh by engaging in training, or volunteering their time and abilities." Persons who are blind who adopt this approach will not only ensure that they are kept abreast of market-related skills, but will also acquire valuable knowledge, experience and skills when volunteering their services.

(c) Lack of motivation

Having and sustaining the motivation to continue looking for a job is critical if success is to be achieved. However, like their counterparts who are sighted, persons who are blind find it difficult to motivate themselves to look for a job, especially when their efforts have met with limited success. Additionally, for people who face the sometimes-overwhelming personal and societal barriers of blindness, fighting discouragement may be especially arduous. The problem is compounded when job seekers who are blind experience negative attitudes to their impairment at job interviews.

The perception often expressed by many job seekers who are blind is that when an employer realises that an applicant is blind, the immediate response is that "the job has been taken." This in turn leads to frustration and demotivation, resulting in many job seekers who are blind not applying for employment, even if they possess the requisite knowledge and skills.

(d) Lack of job preparation skills

Undeniably, securing employment will be a daunting task if job-seekers do not have the necessary job preparation skills, such as reading vacancy advertisements to know what skills are required; preparing a curriculum vitae; and acquiring job interview skills. Consequently, success in acquiring employment hinges on the acquisition of adequate and appropriate job preparation skills.

In South Africa, skills training for persons who are blind is provided by several organisations, notably, Optima College in Pretoria, and the Pioneer Institute in

Worcester, Western Province, which provide, inter alia, Call-Centre and computer skills training, in preparation for possible employment in these fields.

Of critical importance is the need to know what is important to employers. According to Maxson (1997:17), employers do not want to know that hiring a person who is blind is financially sound and good business. Instead, they need to know that only those persons who are blind that have appropriate skills will be referred, and that all necessary follow-up services will be provided.

Acknowledging that interaction with employers is an important part of securing competitive employment referral opportunities, Maxson (1997:17) advises rehabilitation personnel that thorough planning is critical to creating an environment in which employers welcome referrals of potential employees who are blind.

(e) Deficits in social interaction skills

As with their sighted counterparts, the acquisition of sound social interaction skills for employees who are blind is very important. Persons who are blind who do not master this skill would experience serious difficulties, both in relating to fellow employees, or requesting assistance in various situations. While employees who are aloof and reserved are often ignored, those who are affable and willing to interact on a social level, readily win the friendship and support of fellow employees. Given the importance of social

interaction skills, its place in the life skills curriculum of rehabilitation agencies cannot be over-emphasised.

2.6.4.2 Societal barriers

Personal barriers are often intensified by significant societal barriers, that is, barriers that occur when individuals with disabilities interact with their surroundings.

According to O'Day (1999:632), these barriers have little to do with the individual or the disability, but are endemic to the social environment. O'Day urges people with disabilities to confront these barriers, irrespective of their personal attributes or skills. He maintains that the barriers cannot be overcome by individual perseverance, acquisition of skills, or experience.

Societal barriers include, but are not limited to the following:

- Negative attitudes to blindness
- Inadequate access to careers and career information
- Insufficient training opportunities
- Lack of access to assistive technology
- Lack of public transportation.

(a) Negative attitudes to blindness

Perhaps, one of the most oppressive barriers for many persons who are blind is the negative attitudes they often experience. Consequently, securing and maintaining employment may be hampered by negative attitudes to blindness, including limited expectations, stereotypes, and misunderstanding. Although persons who are blind may encounter these barriers daily, these experiences would most likely be heightened during the job search process.

Over-protective parents, for example, may discourage a person who is blind from seeking employment, believing that he or she would encounter insurmountable obstacles when travelling to work, or when performing tasks in the workplace. Often, even those who are willing to assist persons who are blind in reading vacancy advertisements, may only select those he or she believes would be most appropriate.

Job seekers who are blind frequently cite the communication barrier as a crucial factor in job interviews. The employer does not know what questions to ask, with the result that there is a huge communication barrier.

(b) Inadequate access to careers and career information

Until recently, career opportunities for persons who are blind were seriously limited. Based on the prevailing stereotypes, persons who were blind were pigeonholed into specific occupations. For example, while professions such as Law, teaching, physiotherapy and social work were suggested for those entering higher education, telephony, piano tuning and audio typing as vocations were invariably the only options for school leavers who did not wish to enter higher education. Consequently, planning for a career and having access to appropriate training and services to realise career

goals is an essential part of obtaining and maintaining employment for persons who are blind.

The study by Gillies, Knight, and Baglioni (1998) examined consumers' perceptions of access to employment for persons who are blind as one target group within the disability field. The perceptions of persons who are blind were compared with the perceptions of people who are sighted.

Results of the study involving 85 persons who were blind, and 84 persons who were sighted, indicated that persons who are blind and those who are sighted view work as equally important in their lives. However, persons who are blind reported that they were significantly less satisfied with career development and services and training opportunities as compared with their peers who were sighted.

Unquestionably, the role of career counsellors in assisting learners who are blind with career counselling and career development is critical. In addition, decision-making and specific skill development are key components in the career preparation process. With specific reference to decision-making, Ryder (2003:149) observes that "with emphasis on informed choice within the vocational counselling arena, counsellors are faced with the challenge not only of providing their clients with sufficient information, but of communicating it in a way that can be understood and accepted." Ryder asserts that facilitating clients' informed decision-making holds promise for attaining successful employment outcomes. Consequently, job seekers who feel a sense of empowerment regarding decision-making tasks are more apt to obtain positions that are compatible with their needs, interests and goals (Ryder 2003:151).

Undoubtedly, career preparation must begin at school. In this regard, Wright (1997:133) emphasises that careers education and guidance must be an integral part of the curriculum for any young person. For learners who are blind, it deserves particular prominence because their transition from school to work is often a more complex process. "To neglect the area of career education and guidance would be not only discriminatory, but a denial of the right of a person with a visual impairment to be included in society through participation in the labour market."

(c) Insufficient training opportunities

While several skills development facilities exist for sighted persons, persons who are blind are forced to attend the limited facilities that are usually centralised, and away from the majority of persons who are blind. This has serious cost implications, as those requiring training must pay for both the cost of transport to and from the training facility, and for tuition and accommodation.

Even if we accept that persons who are blind could receive their training in regular training centres, the specialised resources, such as adaptive technology, are seldom available to accommodate their needs.

(d) Lack of access to assistive technology

Admittedly, when the issue of employment for persons who are blind is discussed, the question of reasonable accommodation invariably surfaces. In terms of the Code of Good Practice: Key Aspects on the Employment of People with Disabilities (South Africa 2002:7), the provision of reasonable accommodation entails adapting existing equipment, or acquiring new equipment, including computer hardware and software.

Depending on the needs and responsibilities of the particular individual, computer hardware may include the following:

- A Braille embosser
- A scanner
- A portable notetaker
- A refreshable Braille display
- A Perkins Braille
- An audiocassette recorder.

Depending on the needs and responsibilities of the particular individual, computer software may include the following:

- Text-to-speech software
- Scanner software
- Braille translation software.

However, employees who are blind often experience difficulties in convincing potential

employers to purchase the necessary assistive technology, resulting in frustration and demotivation. Many employers cite the high cost of specialised technology, and are therefore reluctant to employ persons who are blind.

(e). Lack of public transport

The lack of reliable public transport has often been cited as a serious difficulty for many employees who are blind. This is particularly true when the place of employment is far from the public transport routes. Additionally, many persons who are blind are unable to accept positions that required shift work because of the limited public transport at night and over weekends and public holidays. Perhaps, a major reason for many employees experiencing difficulties is that they lack independent travel skills and self-confidence to use public transport, or to negotiate busy intersections.

In their study of the strategies used by visually impaired teachers of learners with visual impairments to manage the visual demands of their professional role, Lewis, Corn, Erin, & Holbrook (2003) found that overcoming difficulties with regard to transport to and from school proved to be one of their greatest challenges. Although the teachers interviewed used a variety of strategies to manage their travel responsibilities, including using buses, taxis and personal drivers, or simply walking to and from school, it was evident that the issue of transport surfaced as one of the most frustrating aspects of their work.

During focus-group interviews, the intensity of their difficulty with regard to transport was expressed through comments such as: "the biggest headache", "the most stressful part of my job", and "travel is the biggest problem I face" (Lewis et al 2003:160).

2.6.4.3 Programmatic barriers

Vocational rehabilitation service providers in general are under increasing pressure from consumers and consumer organisations to demonstrate that the services they provide result in improved skills and quality of life of the learners they serve. As programmatic barriers for persons who are blind may be experienced in vocational rehabilitation centres, it would be important for such centres to evaluate the quality of their services, and to establish whether persons who are blind are equipped with the necessary job-seeking or employable skills. Aspects that should be evaluated include the following:

- The quality of the counsellor-client relationship
- The sensitivity and responsiveness of the agency staff
- The quality and relevance of training programmes to meet specific vocational needs.

2.6.5 Expanding access to employment for persons who are blind

In his 2003 State of the Nation Address, South Africa's President Mbeki declared that "our country has a continuing task to push back the frontiers of poverty and expand access to a better life for all. The challenge we all face as South Africans is to put our shoulders to the wheel to accelerate the pace of change" (South Africa 2003:1).

Acknowledging the critical importance of access to a better life for all persons, the pace of change with regard to the employment of persons who are blind in our country must be accelerated, thereby eliminating the legacy of disadvantage and marginalisation that keeps the majority of persons who are blind out of the mainstream of economic opportunity and progress.

2.7 CONCLUSION

In tracing the historical background to blindness, what emerges forcefully is that while there have been remarkable changes with regard to education and employment opportunities for persons who are blind, and while significant developments have been made in respect of devices to enable persons who are blind to access information in print, there is still a general lack of understanding on issues pertaining to blindness. The result is that misconceptions regarding blindness abound, and attitudes to persons who are blind are often based on stereotypes. Consequently, only when there is a greater understanding of blindness and issues pertaining to blindness will persons who are blind be given equal opportunities to meet the challenges of education, employment, and meaningful participation in society as independent, productive citizens.

CHAPTER 3

AN EVALUATION OF THE READING AND WRITING MEDIA FOR PRACTICAL APPLICATION IN EDUCATION AND EMPLOYMENT

GOALS OF THIS CHAPTER

The goal of this chapter is to evaluate the various reading and writing media for their practical application in education and employment.

3.1 INTRODUCTION

Particularly in recent years, prompted by the need to gain greater independent access to a wider range of information, many persons who are blind make extensive use of screen access technology, optical character recognition devices, refreshable Braille displays and electronic notetakers in a variety of contexts. These reading and writing media have proved to be so useful and effective, raising debates in the literature on whether Braille as a reading and writing medium would become obsolete (Wittenstein & Pardee 1996, Jones & Wolffe 1996, Johnson 1996); or whether technology would significantly increase the participation in society of persons who are blind (Chong 2000, Edwards & Lewis 1998, Ashcroft 1984). However, despite the perceived decline in the use of Braille, limited studies are available on the impact of the other media on the lives of persons who are blind.

A review of the relevant literature demonstrates a dearth of research on the impact that the different reading and writing media have on the education and employment of persons who are blind. The available literature is silent on the role of talking books and devices with refreshable Braille displays as valuable reading media used by many persons who are blind. While this is so, prominence is given to the use of Braille and audiotaped formats as preferred reading and writing/recording media by persons who are blind.

A further limitation in the literature is that the information on Braille focuses either on a description of the Braille code (Lorimer, 1983; Durre, 1996); or on the process of Braille

reading (Carroll, 1976; and Simon & Huertas, 1996).

On the other hand, many writers, notably, McBride (1974), Crandell and Wallace (1974), Olson (1977), Spungin (1977), Wormsley (1979), and Knowlton and Wetzel (1996) concentrate on speed reading of Braille readers in comparison with sighted readers.

Compared to the plethora of studies in other domains, research in the field of the education and employment of persons who are blind is woefully inadequate. Consequently, a greater volume of research is required if we are to gain a better understanding of the diverse issues pertaining to the education and employment of persons who are blind.

3.2 A DISCUSSION ON THE VARIOUS READING AND WRITING MEDIA

Although there are several reading and writing media used by persons who are blind, for the purposes of this study, these reading and writing media have been grouped into three categories, namely:

- Audio media
- Tactile media
- Electronic audio/tactile media.

3.2.1 Audio media

Audio media include the following:

- Audiotapes
- Digital talking books
- Live readers/scribes.

3.2.1.1 Audiotapes

(a) The availability and use of audiotapes

In view of their convenience, suitability and portability, many persons who are blind make extensive use of audiocassette recorders, either to read recorded books, magazines, journals and other materials, or to record information, such as lectures and

lecture notes, to be accessed at a later stage. Additionally, audiotapes are frequently used by many persons who are blind to record speeches, personal diaries, recipes, directions, etc. for retrieval at a later stage. The audiocassette recorder is therefore both a reading and recording medium.

In South Africa, audio libraries such as Tape Aids for the Blind, and the Grahamstown Library for the Blind, record a variety of material in audio format specifically for the use of persons who cannot access print directly without using an electronic device. As persons who are blind fall into this category, they qualify for membership of these organisations, and consequently, receive material in an audio format. In response to the number and variety of requests, these audio libraries record numerous books, magazines, journals, and study guides, which are sent to persons who are blind, either on a weekly, monthly or quarterly basis, or on request and when available.

The following information on the audio services of the South African Library for the Blind is extracted from its 2001-2002 annual report:

- The membership of the audio library increased from 3740 in 2001 to 3830 in 2002, an increase of 90 members
- There was a marginal increase in the circulation figures for books on audiotape from 204286 to 204931.

Books and magazines:

The audio library has 10483 audio books in its collection (South African National Library for the Blind 2002:3).

(b) Description and functioning of audiocassette recorders

Although several types of audiocassette recorders are in use, for the purposes of this study, a distinction is drawn between two-track and four-track recorders.

The two-track recorder is the most common, as it is more readily available. As its name indicates, it records material on two tracks, one track on side A and the other on side B. Essentially, when a recording is made, half the tape width is used. By turning the tape over, the other half of the tape is available to record a second track.

By contrast, four-track recorders are more versatile and particularly useful for studying through audiotapes (Arter 1997a:147). Although not readily available, four-track recorders are more efficient than conventional recorders, as they allow for four tracks to be recorded on each cassette (Arter 1997a:147). Essentially, the process involves listening to one track, turning the cassette over for track two, turning the cassette again for track three, and finally, turning the cassette once more for track four.

Using four-track recorders allows for longer listening time on each cassette, with the result that fewer tapes need to be carried. Additionally, fewer tapes result in fewer interruptions in changing cassettes. Perhaps the most advantageous development in four-track recorder technology is greater and faster access to information on audiotapes. Essentially, this is made possible through facilities such as compressed speech, and voice and tone indexing.

Since speech rates are substantially slower than visual reading rates, aural readers, on average, will require more time to read a piece of text than their sighted peers (Swallow & Conner 1982:132). In order to increase the speed of the recorded presentation, many playback units have a built-in speed control. However, often, when a recording is accelerated, the voice pitch becomes higher and higher, finally resembling the sound of chipmunks. Although with years of practice, some persons who are blind learn to listen to and understand recordings at up to double the original speed, many experience difficulties.

To counteract the distortion caused when speech rates are increased, new equipment has been developed with built-in pitch control and electronic compression for accelerated speech, permitting the recorded information to be accelerated without distorting the voice pitch. This results in compressed speech (Swallow & Conner 1982:132). Essentially, with compressed speech, the words are electronically sampled and shortened without loss of intelligibility.

The accelerated, compressed speech capabilities of new four-track machines can enable learners, particularly those in further and higher education to process large amounts of study material efficiently. However, learners will need to be trained to make effective use of accelerated and compressed speech, as the benefits make it a worthwhile investment of time and expense (Arter 1997a:148).

When using audiotape recorders, the difficulty often experienced by persons who are blind is to quickly locate a specific quotation, paragraph, page, section or sub-section in the text. This may be frustrating, particularly when studying long texts, as the person who is blind may be required to memorise the headings of sections. This would then require the use of another recording device to record notes of specific sections. Two solutions to this problem are voice indexing and tone indexing.

Voice indexing is a technique that permits the recording of key words, such as chapter titles or page numbers, at fast-forward speed, so that those words are discernible only when the player is in the fast-forward mode. Voice indexing may be on the same track as the text, or on the adjacent track, but is comprehensible only in fast-forward mode, enabling the reader to quickly scan the tape to find the required place on the tape. (Swallow and Conner 1982:131).

The most frequently used system of indexing tape-recorded books is called tone indexing (Best 1992:149). This system, like voice indexing, requires listening in fast-forward mode. A low-frequency tone is recorded when each new page is begun. This tone is accompanied at regular playback speed by the announcement of the page number. Chapters are usually identified by two tones. The low-frequency tone becomes a clear beep when played on fast-forward. To locate a specific page, the reader counts beeps from some known point until he or she reaches the desired number. For example, the reader puts the cassette player in fast-forward until a beep is heard. The machine is then stopped and the page number is identified by listening to it in playback mode. Putting the machine back in fast-forward, the reader then counts beeps until the right number is reached. Tone indexing can be used in the rewind mode as well (Swallow and Conner 1982:131).

(b) The value of audiotaped material for persons who are blind

For a sizeable number of persons who are blind, the speed with which they are able to read material through other media such as Braille, the optacon or screen access technology may not always be adequate to meet their needs. Moreover, Braille books are generally bulky, as a single novel, for example, could consist of several volumes.

Equally important is the high cost of access technology, with the result that not every person who is blind is able to afford such technology. Consequently, they may prefer the audiotape media for their reading and recording needs.

The popularity of the audiotape among persons who are blind is demonstrated by the fact that Tape Aids for the Blind, which has in excess of 28000 audiotaped books in its library, has 10000 members, who borrow audiotaped books and magazines on a regular basis (Tape Aids for the Blind Newsletter 2004:1). In addition, according to the 2001-2002 Annual Report of the South African Library for the Blind (2002:3), the audiotape library of the South African Library for the Blind has 3830 members.

In highlighting the value of the audiotaped format for children who are blind, Larsen and Jorgensen (1989:118) state that "innumerable children's books exist, most of them richly illustrated. Combined with films, television, and photographs, these books give seeing children very rich stimulation. They help them form a structured concept of the world." However, as a very limited part of these books is of use to children who are blind, tactile books and talking books for pre-school children have been produced, including songs, plays, and fairy tales with music and/or sound effects (Larsen and Jorgensen 1989:118). These books stimulate children who are blind to better understand the physical world.

For learners who are blind, an alternative to photography and filming is audio recording through which they would be able to preserve experiences. "Recordings can be used as a photo album and as an important educational tool on school tours, for diaries, interviews, plays, etc" (Larsen & Jorgensen 1989:119). The value of audio recordings to capture experiences is supported by Rex, Koenig, Wormsley, & Baker, (1995:11). They maintain that experiences captured through audio recordings should be reviewed regularly, similar to reviewing a book or picture album.

(c) Disadvantages of the audiotaped format

Although the audiotaped format is used by many persons who are blind, there are conflicting views on its value as a reading/recording medium.

Espinola and Croft (1992:45) argue that hearing, for the most part, is linear, as information is transmitted serially, sequentially. Therefore, although one can move

forward or backward on an audiotape, information is perceived and processed a detail at a time.

Although citing different reasons, Tuttle (1996:12) argues that while it is possible to record, index, store, and retrieve personal notes and messages through the use of tape recorders and dictating equipment, persons who are blind who have tried to record notes from a lecture or reference book will attest to just how tedious and cumbersome that particular technique is. He maintains that individuals who rely heavily on the auditory mode to meet their literacy needs find that they must, sooner or later, use additional modalities such as Braille for some tasks. Perhaps his most poignant comment with regard to the selection and use of a reading and writing medium is that "it is important to remind ourselves that what matters is not how a task is performed, but whether the goal is accomplished" (Tuttle 1996:13).

3.2.1.2 Talking books

While there are similarities between the audiocassette and the talking book, as both utilise the audio format, the latter has been included as a separate reading medium for two reasons. Firstly, the material is available in different formats, namely, on vinyl records, audiotapes and compact discs. Secondly, with advanced technology, talking books are now produced digitally, as opposed to being produced in analogue format. This means that while recordings were previously made from master tapes, digital recordings involve the use of machine-readable codes consisting of digits or numbers. Consequently, talking books, which are now invariably produced on compact disc, can be accessed using digital talking book technology.

(a) Description and functioning of the talking book

The history and development of the talking book is often overlooked. Therefore, reference is made to earlier literature to obtain information on its origin.

According to Lowenfeld (1981:114), in the 1930's, Dr Robert Irwin, then Executive Director of the American Foundation for the Blind, pursued an idea of Thomas Alva Edison and turned his interest toward the development of long-playing phonograph records to reproduce the spoken texts of all kinds of printed material. After prolonged experimentation, Dr Irwin secured the interest of the Congress in financing a talking

book library for the blind under the Library of Congress. This led to the establishment of regional libraries for the blind, functioning as circulating centres for recorded and embossed books.

In describing the talking book in its earliest form, Ohnstad (1942:222) states that it was simply a phonograph with a large, slow-speed disc, 33 revolutions per minute instead of the customary 78 revolutions per minute. The records were thin, wide, flexible, unbreakable plates, which were scratch proof. Talking books were used to read novels, dramas, poetry and biographies. "instead of pushing a finger laboriously over miles and miles of dots, all one would have to do was sit back and listen" (Ohnstad 1942:223).

In attempting to draw a clear distinction between talking books, as opposed to books in audiotaped format, Pèpin (2000:208) states that the digital talking book "is simply a set of files which, put together, form a multimedia document."

Essentially, there are three files, which have the following distinct characteristics:

- The first file contains the text of the book with all the indexing tags that describe the structure of the book.
- The second file contains the audio that has been recorded digitally.
- The third file, which is termed the SMIL or (synchronised multimedia integration language) file, contains the necessary data to synchronise the text and the audio.

It follows therefore that the digital talking book consists of both audio and text files, with a separate file that integrates these two media.

(b) The value of talking books

Unlike audiotapes, which are limited to tone indexing to locate chapters and sections, the digital talking book provides greater access to the recorded information. A user who is blind would be able to navigate comfortably through the digital information in order to locate specific information. By simply typing in a text string, a user who is blind would be able to find specific words, phrases, quotations, headings, etc.

In highlighting the crucial role of talking books, Pèpin (2000:202) maintains that "one of the landmark technological achievements toward independent access to information,

after the advent of Braille, was the introduction of the talking book." He states that the arrival of the talking book meant a major cultural breakthrough for the blind community, and for many, it became the key to accessing education, culture and knowledge.

While both Ohnstad (1942:222) and Lowenfeld (1981:114) concur that the talking book would be ideal for persons who lost their sight in later life and had difficulty in developing their sense of touch. Lowenfeld however adds that the Talking Book has become a widely used reading medium, not only for those who became blind later in life, but also as a supplementary reading source for learners who are blind. Based on his view that Braille reading rates are generally slow, Lowenfeld (1981:114) argues that the greatest advantages of the talking book are that it does not require any learning of a special code, and that it permits a faster reading rate than that achieved by most Braille readers. The notion that Braille is a slow reading medium is reinforced by Ohnstad (1942:222) who maintains that the talking book would cut in half the time required for reading a book in Braille.

Notwithstanding the views of Ohnstad and Lowenfeld, with the type of talking book technology available today, coupled with the navigation features that allow the user to move instantly to the required page, section or chapter, it is likely that even fluent Braille readers would be willing to use talking books, as it would provide them with ready access to required information.

The popularity of Talking Books for persons who are blind is reflected in the extensive talking book services offered by organisations in many countries, notably, the National Library Service for the Blind and Physically Handicapped in the United States, the British Talking Book Service for the Blind, the Canadian National Institute for the Blind, the New Zealand Foundation for the Blind, and the South African Library for the Blind (Dobree & Boulter 1982:124).

(c) The disadvantages of talking books

Although talking books have been produced for greater access, clarity and reliability, the disadvantage is that they require specialised equipment to be played. Only a limited number of talking book players are available from the South African Library for the Blind, with the result that the use of talking books in South Africa is limited.

3.2.1.3 *Live readers and scribes*

(a) The use of live readers and scribes

Many persons who are blind rely either totally or partly on live readers and/or scribes for some or all of their reading and writing needs. Their choice of a live reader or scribe may depend on several factors, including the following:

- The material may not be available in an alternate format
- The nature of the material may be such that independent access is not possible, for example, reading diagrams, maps, charts, graphs, and hand-written material
- They may not be conversant with the other media
- Their reading and writing rates may be too slow to cope with the demand of a particular task
- They may prefer a live reader to the other media because of the opportunities for social interaction.

(b) The value of live readers/scribes for learners who are blind

Based on her experiences, both at the Living Skills Centre for the Visually Impaired in California, and at a college, Vancil (1997:74) observed that if a learner who is blind is unprepared for dealing with the issues of live readers and how to complete assignments, he/she may experience major obstacles to success. Vancil's observations not only emphasise the importance of live readers or scribes, but also highlight the need to make timeous arrangements for the services of live readers or scribes.

From the study of 102 college learners who were blind undertaken in the United States of America by McBroom (1997), it is evident that hiring a live reader is a necessary ingredient for the success of learners who are blind in higher education. In their advice to learners who are blind wishing to pursue their studies in higher education, the participants emphasised the following: "hire your own readers, so you can get what you want" (McBroom 1997:230).

In commenting on the dilemma faced by many learners when deciding to hire a live reader, Vancil (1997:74) observed that although learners with visual impairments need

readers, few know what to look for in hiring one. Referring to her own situation in this regard, she stated that "when I interviewed a potential reader, I would give him or her something challenging to read and a picture, graph, or chart to describe. I also looked for a clear, understandable voice; experience; recommendations; and whether our schedules matched" (Vancil 1997:74).

Apart from the criteria used by Vancil when hiring a live reader, there are other aspects, which are equally important. The following summarises these aspects:

- While the rule of thumb is that material should be read at a pace that is neither too fast nor too slow, individual preferences cannot be discounted. Undoubtedly, the reading pace will depend on the type of material being read. Admittedly, while newspaper and magazine articles can be read fairly rapidly, material containing tables, concepts, formulae, etc. should ideally be read at a slower pace. Additionally, the reading pace may be accelerated when a large volume of material has to be read within a short space of time.
- Particularly when researching information, some persons who are blind expect readers to be discerning in their reading by selecting the salient aspects. Clearly, this involves a rapport between the reader and the listener, so that the reader is able to anticipate what would be of benefit to the reader.
- Although it is understood that material should be read at a moderate volume, the reader should be able to respond to special circumstances. For example, when reading a menu at a restaurant, or when reading a programme in a theatre, the reader should read softly but audibly.

Implicit in the foregoing discussion is the fact that apart from the immense value of live readers for many persons who are blind, the importance of securing the services of suitable live readers cannot be over-emphasised. This is particularly relevant because the value of a live reader can only be achieved if he/she has the qualities of a good reader.

(c) Disadvantages of using live readers

Admittedly, even when a live reader is preferred, all reading needs may not be achieved, as this will depend on several factors, including the availability of the reader, and the volume of material that has to be read. A further constraint may be the cost factor

associated with hiring the services of a live reader, with the result that, often, only those who can afford to hire the services of live readers do so.

With specific reference to the use of live readers during tests, Hansen, Lee & Forer (2002:271) argue that for test takers who are visually impaired, using human readers during tests can have several disadvantages. Problems may include an inconsistent quality of reading, the test taker's anxiety and embarrassment at having the reader reread the material, the reader's mistakes in recording answers, fatigue caused by the slowness and intensity of the reader/test taker interaction, and a greater need for extra testing time.

3.2.2 Tactile media

While the previous section dealt with the audio media, this section will focus on the tactile media, which include:

- Braille
- The Optacon

Although a detailed discussion will be provided on Braille and the Optacon, attention will also be given to the use of the slate and stylus, the Perkins Brailier, and Braille embossers, as devices that are used to produce Braille.

3.2.2.1 *Braille*

(a) What is Braille?

Braille, which is a system of embossed dots invented by Louis Braille in the 1820's, is a medium of reading and writing by touch used by many persons who are blind (Jernigan 1994:81). Even those who use other reading and writing media for specific tasks may often prefer to read material available in Braille.

Braille consists of arrangements of dots, which make up letters of the alphabet, numbers and punctuation marks (figure 2).

Figure 2

The Braille Alphabet

a	b	c	d	e	f
g	h	i	j	k	l
m	n	o	p	q	r
s	t	u	v	w	x
y	z				

The basic Braille symbol is called the Braille cell and consists of six dots arranged in the formation of a rectangle, three dots high and two across (refer to figure 1 in chapter 1). Other symbols consist of only some of these six dots.

The six dots are commonly referred to by number according to their position in the cell: positions 1, 2, 3, 4, 5, 6 (figure 3).

Figure 3

The Numbered Braille Cell



Therefore, when speaking of a particular letter of the alphabet, reference is made to the position of the dots in the cell, rather than the number of dots, which make up the letter.

There are no different symbols for capital letters in Braille. Capitalization is accomplished by placing a dot 6 in the cell preceding the letter that is capitalized. For example, in figure 4, the letter "s" is written in lowercase and then in upper case.

Figure 4

Indication of Lower Case and Upper Case



Lower Case "s" = dots 2, 3 and 4.



Upper Case "S" = dot 2, 3, 4 preceded by dot 6.

The first ten letters of the alphabet are used to form numbers. Each of these ten letters either alone or in combination, must be preceded by a number sign, which are dots 3-4-5-6 (figure 5).

Figure 5

The Number Sign



Thus, 1 is number sign *a*;

2 is number sign *b*;

3 is number sign *c*;

10 is number sign *aj (1 and 0)*

Braille makes use of contractions in order to reduce its bulk. While these must be learnt in addition to learning the Braille alphabet, most Braille readers and writers find them convenient when reading and writing. Firstly, when reading, the fingers scan fewer letters or characters, thereby accelerating the speed of reading. Secondly, when writing, fewer characters are used, thus accelerating writing.

There are two grades of Braille. While grade 1 comprises the alphabet and punctuation signs, Grade 2 is a complex code containing 189 contractions.

Grade 2 Braille has special signs for common letter combinations such as: ar, st, ing, sion, tion, ity; and for frequently used words such as and, for, to, in, was.

Some words appear in a shortened form, for example the word receive is represented by the letters rcv.

These contractions are governed by a complex system of rules.

(b) The invention of Braille

Louis Braille, who was born in Coupvray, France on 4 January 1809, is today venerated throughout the world by many persons who are blind. As the youngest of four siblings born to Simon-Ren and Monique Braille, Louis Braille was destined to become the single most important figure in the history of work for persons who are blind (Kirtley 1975:11).

When Louis Braille was approximately 3 years old, he accidentally blinded himself in one eye while playing with one of his father's harness-making tools. Shortly after that, the sight of the other eye was lost as well, owing to sympathetic ophthalmia (Kirtley 1975:11).

At first, Louis Braille attended his local village school. However, in 1819, when he was 10 years old, he was admitted to the Royal Institution for Blind Youth in Paris. As the school emphasized music as a vocational goal for many of its learners, Louis Braille subsequently became a church organist.

In 1829, when Louis Braille was 20 years old, he had already realized that the key to his

success as a person who was blind was access to print material. In particular, he was a musician and needed a way of reading and writing music. This required an effective system to replace the cumbersome raised letters that were used in the very few available books. When Louis Braille first went to the school for learners who are blind in Paris, there were just three books in the library (Best 1992:29).

Louis Braille's inspiration for the development of the system of embossed dots came from Charles Barbier, an officer in Napoleon's army, who developed a method of sending coded military messages. He referred to his system as "Night writing" or *Ecriture Nocturne*, as it was to be employed at night for the exchange of secret intelligence in war zones (Kirtley 1975:11).

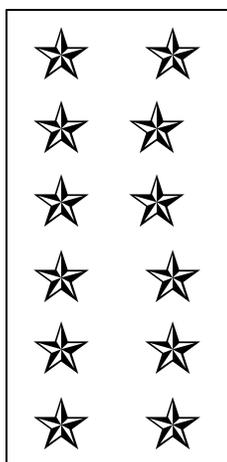
Barbier's system, using a 2 x 6 dot cell which could be embossed in a metal writing frame, was exhibited at the School for the Blind in Paris in 1820. As the system was based on dots, the administration considered Barbier's system unworkable. However, Louis Braille recognized the immense value of Barbier's technique. He preferred the dot system to the raised line letters, but felt that the elongated cell was too long to fit under the fingertips (Harley et al 1997:5). It was this factor that prompted him later to work towards refining it for practical use.

As a member of the teaching staff of the school he attended, Louis Braille began developing his revolutionary system of reading and writing. He devised a 6-dot 3 x 2 cell (figure 1), which could be felt easily by using the fingertips.

The first slate or writing frame for embossing dots was designed by Charles Barbier with a 12-dot cell (figure 6).

Figure 6

The 12 dot Cell



However, Louis Braille used the Barbier slate for his 6-dot cell by covering six of the lower dots (Harley et al 1997:6). An explanation of the slate and stylus is included in 3.3.2.1 viii.

In 1829, Louis Braille published an explanation of his embossed dot code, which he believed would be superior to the embossed letters, which Hauy had employed as a means of reading. By 1834, he had perfected the code for literary Braille and worked on a code for music notation (Roberts 1986:8).

The officials at the Institution were not convinced that Louis Braille's dot system was more effective than the embossed letter system which Hauy had developed. The teachers did not prefer the system because they had to memorize a new code. Equally, the administrators felt that the dot code set persons who were blind apart from the rest. However, the learners at the school to whom Braille had taught his system, preferred it to the raised line letters (Roberts 1986:8).

Perhaps the most significant aspect with regard to the development of a system of embossed dots is that while previous systems of reading and writing for persons who were blind focused on embossed Roman lettering, the critical insight of both Barbier and Braille was that the fingers discriminate point stimuli more readily than the line properties of ordinary letters (Kirtley 1975:11).

In 1854, two years after the death of Louis Braille, the Paris institute at last adopted his system. By the end of the century, the Braille system had become the universally accepted means of written communication for persons who are blind.

(c) Devices used to produce Braille

In this section, attention will be given to the use of the slate and stylus, the Perkins Brailier and Braille embossers, as devices that are used to produce Braille.

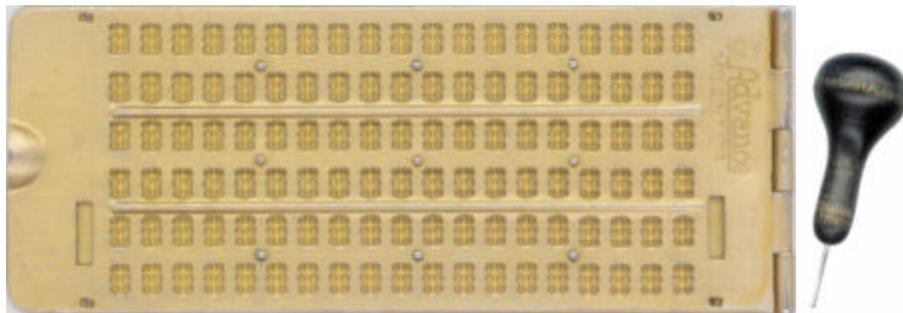
i. The slate and stylus

The slate and stylus (figure 7) is advocated by many persons who are blind because of its portability and lower cost when compared to the Braille writer. It is also much quieter

in operation, especially when using thin paper and a plastic slate (Harley et al 1997:207).

Figure 7

The Slate and Stylus



Writing Braille with a slate and stylus compares to writing print with a pen or pencil. The stylus is used to push dots down through the paper, while the slate serves as a guide. The speed of writing Braille with the slate and stylus is about the same as the speed of writing print with a pen or pencil. However, speed and accuracy would depend both on the skill and experience of the user, and the frequency of use.

The front section of the slate has a series of rectangular windows or cutouts corresponding to the outline of the Braille cell. Around the edges of the windows are indents or divisions showing the correct position of each of the six dots. Each cell therefore has six indents or divisions, corresponding to the six-dot cell. The back section of the frame consists of a matched series of recesses. To use the slate and stylus, a sheet of manila paper is placed between the front and back sections of the hinged metal frame. The frame is then closed, aligning the paper parallel to the windows in the frame. Braille symbols are formed when dots are pressed into the paper within the cutout areas (Dobree and Boulter 1982:174). Writing with the slate and stylus begins at the right hand side of the slate and progresses toward the left since the dots are being produced on the underside of the paper. The page is then turned over to be read (Harley et al 1997:206). Although the prospect of mirror image writing, that is, writing in reverse from right to left, may appear to be complicated and tedious, repeated practice will lead to speed and accuracy, providing yet another practical writing option.

The stylus, which is used to emboss the dots, has two parts, the handle and a metal pin. The handle, which is available in a variety of shapes, is made of wood, plastic or metal. The metal pin has a pointed or rounded tip to form dots on the paper.

Notetaking is one of the primary uses of the slate and stylus. Learners can be asked to take notes during field trips when Braillewriters would be too cumbersome to carry along. Other functional uses include jotting down homework assignments, making personal shopping lists, labelling tapes and disks, writing recipes, labelling canned goods, recording telephone numbers, or marking playing cards. Birthday or holiday cards can easily be Brailled using a slate and stylus.

As the operation of the Perkins Braille (see further on) appears to be simpler than writing with a slate and stylus, many teachers rely almost exclusively on the Perkins. If they teach the slate at all, they wait until junior high or high school, and they may regard it as mainly for the college-bound. This approach has decided disadvantages:

- The learner is made to believe that the slate and stylus is difficult to use
- There are limited opportunities to practice with the slate and stylus, thus greatly reducing speed and proficiency
- Inadequate practice with the slate discourages the use of Braille anywhere except at home and school where the Perkins is available.

According to Caton (1991:20), for learners who are blind, use of the slate and stylus in writing is desirable as soon as there is sufficient strength and motor control, a sense of directionality, and concepts of reversal.

ii. The Perkins Braille

Although there are various types of Braille machines, both manual and electric, this study will focus on the Perkins Braille, as it is the machine that is most commonly used in schools for learners who are blind and training centres in South Africa.

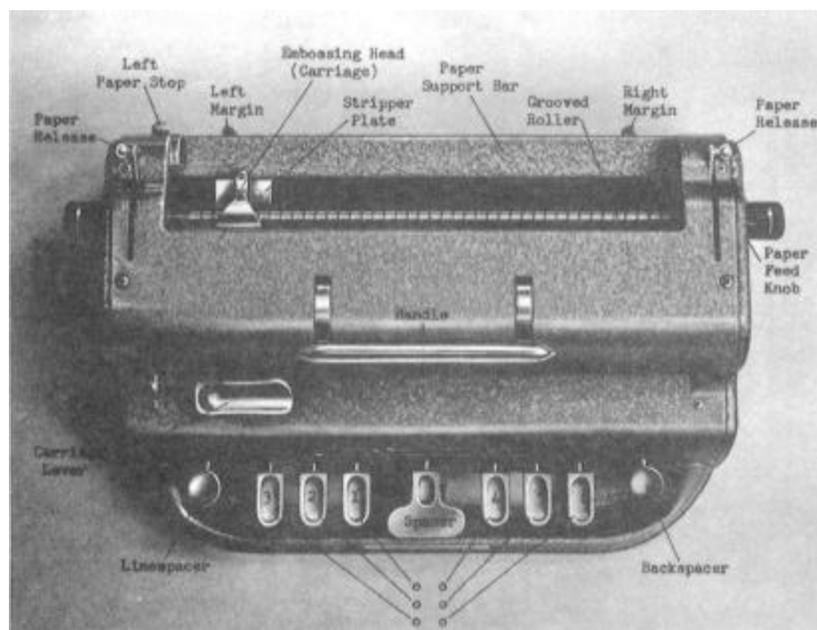
In 1950, the Howe Press at the Perkins School for the Blind in Massachusetts, United

States of America, produced the Perkins Braille (Roberts 1986:10). However, while the Perkins Braille was initially only manufactured in the United States of America, it is now also assembled in South Africa for sale both locally and internationally at significantly lower rates.

The Perkins Braille (figure 8) is a mechanical writer, which has nine keys, six of which are used for embossing, each key corresponding to a dot in the Braille cell. When the six keys (three on either side of the space bar) are pressed down in the appropriate combination, raised letters and signs are embossed onto a sheet of manila paper, which is fed manually into the machine.

Figure 8

The Perkins Braille



(From: Howe Press, Perkins School for the Blind).

Apart from the space bar, which is positioned in the middle of the six embossing keys, two additional keys are used. The line spacing key, which is found on the extreme left of the embossing keys, and the backspace key, which is to the extreme right of the embossing keys.

To facilitate the embossing process, the Perkins Braille is also equipped with the

following knobs and levers:

- A carriage return lever
- Two paper release levers on the top right and left edges of the machine
- To paper feed knobs on the left and right sides of the machine.

The Perkins Braille embosser embosses dots on one side of the paper. However, unlike the slate and stylus which embosses dots on the underside of the paper, The Perkins Braille embosser embosses dots upwards so that the user can read what he/she has written without having to remove the paper from the machine (Dobree & Boulter 1982:174).

According to McCall (1997:156), in schools in the United Kingdom, the Perkins Braille is probably the most commonly used device for writing. Information obtained in South Africa from schools for learners who are blind also indicate that the Perkins Braille is used to write assignments, notes and other information in Braille.

The versatility and accessibility of the Perkins Braille renders it a popular writing device. To illustrate this, the unimanual Braille is designed for individuals who have use of only one hand. In addition, elongated extension keys are available from Howe Press for individuals with a disability, which reduces the amount of pressure that can be exerted on the keys (Harley et al 1997:207).

iii Electronic Braille embossers

Increasingly, electronic Braille embossers are being used in Government departments, organisations, schools and higher education institutions to produce material in Braille. Notwithstanding this, given the numerous requests for books and magazines in Braille from schools and organisations of and for persons who are blind, the three Braille production units in South Africa continue to produce Braille material on a large scale, making extensive use of faster, more expensive embossers.

Taylor (2001) a Computer Specialist at the International Braille and Technology Centre of the National Federation of the Blind, discusses a few critical factors that should be considered in choosing an electronic Braille embosser. The following summarises the important questions that should be raised:

- What is the volume of Braille that will be produced, and how frequently will the embosser be used? While the slowest embosser prints at approximately ten characters per second, the fastest embosser prints at approximately 800 characters per second.
- Embossing Braille is a very active mechanical process, which often creates a great deal of noise. Will the noise be a disturbance in the environment in which the embosser will operate? Will there be a need for a sound-proof case?
- As the quality of Braille production is crucial, will the embosser produce dots of a height that will be easy to read?
- Does the embosser produce both single-side and interpoint Braille? Interpoint Braille refers to Braille that is produced on both sides of the page.
- Will technical support be readily available? (Taylor 2001:18)

Although there are several models of electronic Braille embossers produced in the United States of America and Europe, Taylor (2001:18) provides a brief explanation of the popular embossers, focusing on:

- The speed of the embossers in characters per second;
- Whether the embossers allow for independent operation by users who are blind;
- Whether the embossers have voice output menus;
- Whether the embossers have buttons with Braille labels;
- Whether the embossers are able to produce large volumes of Braille;
- Whether the embossers are able to produce single-side or interpoint Braille, or both; and
- Whether the embossers have the facility to produce graphics.

(d) Perceived decline in Braille literacy

Referring specifically to the situation in the United States of America, Schroeder (1996:136) states that since the 1980's, membership organisations of persons who are blind, parents of children who are blind, professionals in the field, and producers of Braille materials have decried the nation-wide decline in the use of Braille and in Braille literacy. Consequently, they called for the increased availability of Braille materials, and greater access to instruction in Braille.

The growing concerns regarding the perceived decline in the use of Braille is further highlighted by Johnson (1996:276) who reports that parents, teachers and learners are beginning to recognise that there is a problem when many children who are blind are no longer learning to read and write Braille. Several theories for the decrease in Braille literacy have been proposed, including the following:

- Braille is obsolete
- Teachers are not qualified to teach Braille
- The Braille code is too difficult.

According to Wittenstein and Pardee (1996:108), the composite responses of respondents in a nation-wide survey conducted in the USA in 1991-1992 indicated the following as possible reasons for the decrease in Braille literacy:

- The increase in the number of blind children with concomitant disabilities who are non-readers
- Greater reliance on technology
- Disputes on the utility of the Braille code
- Inadequate teacher preparation
- Educators' knowledge of Braille and methods of teaching Braille
- Negative attitudes toward Braille

What emerges very forcefully is the concurrence with regard to the underlying reasons for the perceived decline in the use of Braille in the United States of America. However, no empirical data is available on Braille literacy in South Africa.

(e) The status of Braille in South Africa

In South Africa, formal instruction in Braille commenced in 1881 when the first learners who were blind were enrolled at the then Worcester Institute for the Deaf and the Blind. As South Africa was then a British colony, the instruction in Braille was based on the British system.

While instruction in Braille was initially restricted to the English Braille code, there was

an expressed need for the development of a Braille code for the other languages used in South Africa. Consequently, as the first step in this direction, Dr Victor Vaughan, who was then the Vice-Principal of the Worcester School for the Blind, was tasked to undertake a scientific study of the Afrikaans Braille code in 1932. From that time, Dr Vaughan, in collaboration with persons who were knowledgeable about Braille, was closely associated with the development and subsequent revision of the Afrikaans Braille code. In 1957, an ad hoc committee was appointed to discuss the development of the Afrikaans Braille code. Based on their knowledge and experience, Ms Connie Aucamp and Johan van Eeden were appointed by the committee in 1959 to prepare a guide for the use of Afrikaans Braille (Mulibana 2002:35).

In the 1950's, prompted by the need for Braille in the African languages in South Africa, the first two codes were developed under the leadership of Dr Walter Cohen, the then Chairperson of the South African National Council for the Blind. Essentially, the first codes consisted of two guides, one, which contained a combined code for the two Sotho languages and Setswana, and the other, a combined code for Isizulu and Isixhosa. In 1980, a committee consisting of Dr Cohen, Antonie Zeelie and PJ du Plessis, developed a code for Tshivenda. This code was subsequently revised.

The South African National Council for the Blind, acknowledging the need not only for further revision of the existing codes, but also for codes for Xitsonga, Isiwati and Isindebele, tasked Braille South Africa to undertake these responsibilities. This task was finalised in 2000.

South Africa currently has Braille codes for each of the eleven official languages, namely: English, Afrikaans, Sepedi (North Sotho), Setswana, Sesotho (South Sotho), Isindebele (South Indebele), Isiwati, Isixhosa, Isizulu, Tshivenda and Xitsonga (Mulibana 2002:37).

It is estimated that there are 260,000 persons who are blind in South Africa. According to the 1997 statistics, there were 8000 blind learners of school-going age, and only 800 Braille users at the schools for learners who are blind. According to the 2001 census statistics, there are 1,091,022 persons with visual impairments in South Africa. Unfortunately, there is no breakdown with specific reference to persons who are blind.

The need to promote Braille literacy is continually emphasised by organisations of and for persons who are blind in South Africa. The following highlights major initiatives undertaken in South Africa to promote Braille literacy:

- In 1976, the South African National Council for the Blind introduced the Elementary Braille Examination at schools for learners who are blind
- In 1997, the South African National Council for the Blind initiated the Perkins Braille Project. With Perkins Braille machines being assembled in South Africa, users in South Africa and Africa would be able to purchase machines at significantly lower prices
- In 2001, the South African National Council for the Blind initiated the Slate and Stylus Project with a view to producing slates and styluses at affordable prices (Mulibana 2002:37)
- For many years, the South African National Council for the Blind recognised the need for skilled Braille instructors to meet the need for Braille instruction in schools and organisations working with learners who are blind. With substantial donor funding, the South African National Council for the Blind provided training to 54 Braille instructors during 2002-2004
- The South African Blind Workers Organisation, through its Braille Services, makes available three free Braille publications, namely:
 - Brailorama
 - Braillorette
 - Braille Trumpet
- The South African National Council for the Blind provides two free publications:
 - Imfama, a BI-monthly journal of the South African National Council for the Blind
 - Blindaba, a magazine spotlighting general issues in South Africa
- Pioneer Printers makes available a magazine titled Die Nuwe Pionier
- The South African Library for the Blind provides magazines and books in Braille to its members.

(f) The value of Braille

Braille is extraordinarily flexible in that it can be used for all languages. In addition, it can be used for music, mathematical and scientific symbols. Modern technology in a variety of forms is used to achieve maximum output of Braille for recreational and instructional

purposes.

In calling for the increased production of material in Braille, Walhof (2001:14) argues that in the real world, "we must make available as much Braille as possible, the best instruction possible, as much appropriate reading material as possible, and as much moral support from school and family as possible." To this end, there are Braille printing houses in all the major countries of the world, resulting in a constant exchange of books and magazines around the world by organizations and libraries for the blind, as well as between persons who are blind.

Referring to the value of Braille, Cranmer (2000:136) observes that "There is something about the written word that delights the human mind. There is something mystical, miraculous, and not fully understood that happens when the trained and practised fingers of a blind reader skim the symmetrical patterns of Braille dots that transfer to his conscious mind words, thoughts, ideas, and emotions from a friend or from people long dead."

In highlighting the issue of independence through Braille, Dobree and Boulter (1982:121) observe that "learning to write in Braille adds substantially to a blind person's self-sufficiency in normal activities of daily life."

Espinola and Croft (1992:46) state that Braille offers flexibility that speech does not. "At a tactile glance, you can identify an italicized, capitalized "A" with one brush of the finger. You can run your hands over the page and get a feel for the general layout. You can compare two pieces of information on the page, or on separate pages, one with each hand. Braille is stationary, sound is fleeting."

Having experienced progressive loss of vision, Pierce (1996:9) states "I will always bitterly regret that I was not taught Braille as a child. Today, I am struggling to gain the speed and accuracy in reading Braille that I should have had by the time I was ten. I have now been working at it for six years, and my reading speed has tripled, but I must face the fact that I will probably never read as well as a bright ten-year-old."

In portraying a positive attitude to Braille, Maurer (1996:24) expresses deep appreciation to his mother for insisting that he learns it. "How fortunate I am that she understood the

necessity for me to read. How fortunate I am that she had learned Braille herself and was able to teach me."

Referring specifically to the need to make children understand the value of Braille, Eckery (1996:26) argues that "simply telling children that Braille is a blind person's equivalent to print is seldom enough. They seem to understand that Braille can be used in school for reading and taking notes, but they need to know for what other purposes Braille can be used."

Perhaps one of the most memorable comments in praise of Braille was made by Helen Keller when she said "The beauty of Braille is that you can touch it and be touched by it." (Keller 1928:12).

(g) Perceived disadvantages of Braille

The view that Braille is a difficult reading and writing medium is fairly common, with the most popular argument being that the Braille code is far too complex. This invariably refers to the use of contracted Braille, and the difficulties that it is reported to cause.

Harley et al (1979:70) stress the complexity of the Braille code, and hence, of Braille contractions. They employ the illustration of the child who, looking at a print letter, has 26 possible options for identifying that letter. For the Braille reader, on the other hand, the situation is far more complex. The Braille cell presents 63 options, since there are 6 possible dot combinations within that cell. But many of those dot combinations represent more than one meaning. A tabulation of those additional meanings adds 72 more options, thus increasing the possibilities to 135. However, since those same configurations have additional meanings in the Braille code for mathematics and music, the number of possible options is staggering.

For Lorimer (1983:24), contractions entail much unlearning and relearning of words in Braille, rather than gaining knowledge of words through frequent repetition of the same configuration.

3.2.2.2 *The optacon*

(a) Description and functioning of the Optacon

The optacon, an optical to tactile converter, essentially converts regular print or computer output into enlarged, vibrating, tactile forms, which resemble the shape of the corresponding letters over which the hand-held camera passes (Telesensory International 1990, Tuttle 1984, Best 1992, Dobree & Boulter 1982).

Clearly, training in the use of the Optacon is a prerequisite for its effective use, and involves the following:

- Identifying print letters
- Using controls which adjust the size of the tactile image
- Employing techniques of camera use
- Developing fluent reading through using syntactic and contextual clues.

There are three major components to the Optacon:

- The camera
- The control unit
- The tactile array.

The camera is a hand-held device, which contains two tiny lamps for illumination of the reading area. Within the camera is a silicon integrated circuit of 100 light-sensitive phototransistors. The camera serves as the "retina" and sends the shape of what it sees to the control unit. The control unit processes information it receives and drives the tactile array (Telesensory International 1990:2).

The control unit contains a microprocessor or computer chip, which is responsible for the management of information and the adjustments necessary to meet the needs of the user.

The tactile array, which is approximately 2,5 centimetres long and 1,25 centimetres wide, consists of 100 vibrating rods. Each rod corresponds to each light sensitive area on the camera's retina. For example, when a portion of the retina sees a black letter on a page, the corresponding rods in the tactile array vibrate. The portion of the retina seeing the white background around the letter will not vibrate (Telesensory International 1990:2).

To read print or examine graphics with the Optacon, the user who is blind moves a miniature camera across a line of print with the right hand, while feeling a tactile representation of the individual letters or numbers with the index finger of the left hand resting on the tactile array, which consists of 144 vibrating pins (Todd 1986:185). When the end of the line is reached, the camera is moved to the beginning of the next line, ensuring that no line in between is skipped. This process is repeated until the end of the page is reached.

(b) The value of the Optacon

The Optacon can be used to read textbooks, paperbacks, typed copy, dot matrix printing and graphs. Some people are able to read the newspaper, although varying type sizes and poor quality ink and paper may create problems. The Optacon may be invaluable as an aid to scanning print material where a large amount of reading is not required, for example, reading letters or document titles (Best 1990:91).

(c) Disadvantages of the Optacon

The tactile array of the Optacon presents only one letter at a time, with the result that even experienced readers find that they can only achieve speeds of 80-100 words per minute (Best 1992:91). Consequently, the Optacon's comparatively slow reading rate is perhaps its greatest drawback.

A further disadvantage of the Optacon is that a person who is blind who wishes to use it must learn the formation of print letters. It is only when he/she is familiar with all the letters, punctuation marks and numbers can training in the use of the Optacon commence.

3.2.3 Electronic audio/tactile media

In the previous section, the focus was on the tactile media. In this section, attention will be given to the electronic audio/tactile media, which include the following:

- Optical character recognition document readers (scanners)
- Refreshable Braille displays
- Portable electronic notetakers

- Computers with text-to-speech software.

Although computers with speech output, and portable electronic notetakers have audio output, they have been grouped separately from the audio media, as the speech output is produced synthetically.

3.2.3.1 *Optical character recognition document readers (OCR scanners)*

(a) Description and functioning of OCR scanners

An OCR system converts printed text into an electronic format, which can be stored in a computer for reviewing or editing (Espinola & Croft 1992:95). Basically, the components of an OCR device consist of the following:

- The scanner (the electronic eye)
- A recognition processor (the electronic brain)
- The software that is used to control how the optical character recognition will
- convert the document.

i. The scanner

The scanner is a hardware device that photographs the text/image from the page being scanned and then transfers the text or image to the computer. A light bar moves under the scanner glass to obtain an image of the page. When a scan is complete, the light bar returns to its home position, which is its original starting point. A user who is blind would know when a page has been scanned by listening to the movement of the light bar.

The electronic image consists of an arrangement of black and white dots. The number of dots per inch (dpi) is referred to as the scanner's resolution. The most common resolution is 200, 300, and/or 400 dpi. The higher the resolution, the more accurate the image (Espinola & Croft 1992:95).

OCR devices designed for persons who are blind generally offer flatbed and hand-held options.

Flatbed or desktop scanners resemble a personal copier, with a glass surface and a camera inside which photographs the page. Flatbed scanners are able to scan almost any type of document, including business cards, single sheets of paper, books and magazines. Many flat-bed scanners make provision for the attachment of an automatic document feeder to avoid manually placing each page on the scanning surface.

Hand-held scanners are generally less expensive because they have virtually no moving parts. However, in view of their size, there are some drawbacks. Traditionally, the very small hand-held scanners require the user to pass the scanner from left to right across a single line. Initially, this may be a daunting task for the user who is blind as the scanner must pass along a straight line. It may require a great deal of practice to become proficient. Fortunately, there is now a hand-held scanner that is larger, approximately 21 centimetres wide, making it possible for the user to scan the page by moving the scanner from the top to the bottom of the document (Espinola & Croft 1992:95).

ii. The recognition processor

The recognition processor analyses the image that is photographed by the scanner. Since OCR technology works largely by recognizing letter shapes, certain types of documents will produce better results than others. This means that OCR technology works best when documents use a clear, standard typeface. Most OCR devices cannot recognize ornate fonts or handwriting.

When a print page has been scanned, the OCR device goes through the process of trying to identify what part of the page is text, which are pictures, how the page is laid out, font styles, etc. Essentially, OCR devices recognise text in two ways, namely, pattern recognition, and font library.

In pattern recognition, the process involves comparing the shapes of characters against predefined templates. Consequently, it stores this information in memory as it analyzes shapes, and becomes more accurate over time.

The process of using a library of fonts is quite different. Here, the recognition board has in its memory a library of several thousand possible fonts, which are essentially

predefined character shapes, which it matches against the captured images. If a particular font does not exist in the library, it may not be readable, in which case the OCR software will insert a specific symbol to indicate that it was unable to read that character. OCR devices that employ a font library recognition system do not learn from experience (Espinola & Croft 1992:97).

iii. The software that converts the document

The scanning process will not be successful unless the software is installed in the computer. The software interacts with the scanner to actually store the document in the computer in a word processing format that can be read and edited.

A notable feature of most advanced optical character recognition software is the built-in speech facility, which allows the user who is blind to scan and read the document. This means that as soon as a page is scanned, the text will be read aloud, providing the user who is blind with almost instant access to the printed material.

(b) The value of OCR scanners

The increasing use of OCR scanners by persons who are blind is indicative of their immeasurable benefit with regard to independent access to printed materials. Many persons who are blind consider an OCR as liberating to them as the automobile is to sighted people (Espinola & Croft 1992:95). The thrill of not only owning a scanner, but also being able to use it with ease and independence to read their bills, letters, documents and books, is immeasurable. Within seconds, a single page can be scanned and the information processed.

For educators or transcribers, OCR scanners can potentially reduce the amount of time required to input print information that needs to be translated into Braille.

(c) Disadvantages of OCR scanners

While several models of scanners, both hand-held and flatbed are currently available, the successful reading of print material depends on the quality of scanners, which, invariably, is closely linked to cost. Equally important, having a scanner also means having a computer system with appropriate OCR software, which is again linked to cost.

A further disadvantage of OCR scanners is that the scanned material has to be edited, which could be a time-consuming and laborious process. For the user who is blind, editing may pose an additional problem as the scanned text must be compared with the original. In summarising the disadvantages of OCR scanners, Chong (2000:56) states that "the technology still misses on average about one in every hundred letters, does not handle cursive writing or pictures, requires at least thirty seconds to process each printed page, and is not portable by any stretch of the imagination.

3.2.3.2 Refreshable Braille displays

Refreshable Braille displays have not been included as a purely tactile medium for the following reasons:

- They are electronic devices, which must be used in conjunction with personal computers, or with portable electronic notetakers
- They provide paperless Braille
- They produce refreshable, as opposed to permanent Braille
- Unlike paper-based Braille, they provide a restricted window of access to the text, as the user is restricted to either a single line, or a few lines of text at a time.

(a) Description and functioning of refreshable Braille displays

"A Braille display device produces Braille much the same way a speech synthesizer generates sound (Espinola & Croft 1992:72). A line of refreshable Braille consists of tiny electronically driven plastic pins that pop up to form the Braille characters. Essentially, a refreshable Braille display (figure 9) takes information appearing on a computer screen, translates it, and displays it in Braille a line at a time.

Figure 9

Refreshable Braille Display



The term "refreshable Braille" is used because "the Braille display "refreshes" itself to exhibit the characters immediately following the cursor on the monitor (Edwards & Lewis 1998:119).

According to Blazie (2000:120), in the 1970's, commercially-available Braille displays had electro-mechanical arrays based on very tiny solenoids, which would latch a pin in the up or down direction. However, although they functioned, they were prone to stick when they were exposed to dust and dirt. Refreshable Braille displays in current use function more efficiently, providing users who are blind with access to information at their fingertips.

Compared to the amount of information immediately available to a sighted user on a full screen, a refreshable Braille display provides a restricted window of information at any time. However, regular users develop speed with practice.

Espinola and Croft (1992:72) state that while several attempts have been made to produce a full-screen electronic Braille display, the many moveable parts have made it costly and unpredictable.

Although the six-dot cell is the norm for most Braille displays, Refreshable Braille display devices can also display eight-dot Braille. Dot seven is used to indicate capitalization, and dot eight is used to represent control characters and graphic symbols. In this way, more symbols can be represented in a single Braille cell (Espinola & Croft 1992:72).

(b) The value of refreshable Braille displays

Refreshable Braille devices provide the user who is blind with immediate feedback on information entered in or displayed by the computer. They are also a more accurate means of gaining access to difficult-to-remember information, such as displays of numbers or spatial information, as in columns or spreadsheets (Edwards and Lewis 1998:119).

(c) Disadvantages of refreshable Braille displays

Despite their usefulness, refreshable Braille displays are still beyond the financial reach

of most persons who are blind. While the ideal situation would be to have a multiple-line Braille display, the cost of manufacturing a refreshable Braille display with multiple lines is prohibitive.

Understandably, using a refreshable Braille display requires both a knowledge of Braille, and the ability to read it fluently if it is to be of value.

3.2.3.3 *Portable electronic notetakers*

Figure 10

Portable Electronic Notetaker



(a) Description and functioning of portable electronic notetakers

Notetakers, which are often referred to as personal data assistants for the blind, are small, lightweight, portable and versatile electronic devices that can be used for a variety of purposes. Figure 10 provides an example of a popular notetaker.

Although these devices are called notetakers, the actual note-taking function is a relatively small fraction of what they can do. Popular devices which fall into the category of notetakers include the Braille 'n' Speak, Type 'n' Speak, Braille Lite, Type Lite, BrailleNote, and PAC Mate (Chong 2003:63).

Like the computer, the portable electronic notetaker is both a reading and writing device. Most notetakers allow the user to input information using either a Braille or QWERTY keyboard. Data can be retrieved and modified later directly through the device's speech

output or refreshable Braille display, or by downloading it into an accessible computer for further manipulation (Edwards and Lewis 1998:119).

(b) The value of portable electronic notetakers

Unquestionably, the portability of electronic notetakers makes them suitable for recording notes, for example, at meetings, conferences and seminars. In addition, they can be used to quickly record telephone numbers or messages for later retrieval.

Notetakers generally have additional features, allowing a user who is blind to execute ordinary and scientific calculations, and keep track of time and appointments.

Chong (2003:64) cites the following advantages of portable electronic notetakers:

- As accessibility is built into the notetaker, there is no need to purchase screen access software
- Documentation and training materials are available in alternative formats because portable electronic notetakers are designed for persons who are blind
- Start-up time is rapid, and it only takes seconds to get back into a file
- Portable electronic notetakers and accompanying accessories can be purchased from a single vendor
- No additional effort or technical knowledge is necessary to activate the Braille display when it is part of the unit
- Direct Braille input is possible with portable electronic notetakers.

(c) Disadvantages of portable electronic notetakers

Given the high cost of portable electronic notetakers, many persons who are blind often cannot afford to purchase these devices. In addition, the limited memory capacity of these devices often makes it necessary to upgrade or purchase additional memory chips, thereby adding to the original cost of the device.

3.2.3.4 Computers with speech output

(a) Introduction

Computer technology has rapidly captured almost every facet of our lives, with computers making their strong presence in many homes, schools, tertiary institutions and business organisations. Many persons who are blind are equally influenced by computer technology, and continue to use it for personal, educational and employment purposes. In this regard, Chong, (2000:53) observes that persons who are blind have entered the age of technology with a vengeance, as technology has profoundly affected their lives. However, he cautions that persons who are blind must be able to take advantage of the new technologies that are sure to be developed, or risk being relegated to the technological backwaters of society" (Chong 2000:65).

(b) Description and functioning of computers for persons who are blind

For the use of persons who are blind, a standard computer is equipped with screen access (text-to-speech) software, allowing them to navigate the screen, generate and read documents, and surf the internet. In fact, the screen access software performs two functions:

- To provide access to information on the screen, including menu bars, dialogue boxes, and prompts
- To provide verbal verification of what is being input from the keyboard.

The screen access software is part of the speech system. Essentially, a speech system consists of two parts, namely, a synthesizer, and text-to-speech software.

A synthesizer physically produces the speech. There are essentially three types of synthesizers, namely:

- An external synthesizer (a voice box)
- An internal synthesizer (a circuit board)
- A built-in software synthesizer.

Software synthesizers are used extensively today, making it unnecessary for persons who are blind to carry external synthesizers, or to have internal synthesizers in their computers.

Accompanying the synthesizer is the text-to-speech software, which is an application

programme that monitors the activities of other application programmes and reports textual information to speech synthesizers designed to receive text from screen readers. A text-to-speech software monitors keyboard, screen and Windows activities and acts on information it needs, such as screen text changes, opening and closing windows, the appearance of dialogue boxes, changes in focus, etc. while simultaneously allowing other applications to run normally. The screen reader software processes this information and sends it as electronic text to the speech synthesizer for conversion to audible speech. The functions and settings of a screen reader software, which can be saved and recalled automatically, allow the computer user to operate application programmes interactively and without pause.

The following summarises the general features of advanced screen access software:

- Allows the user to read the current, previous, and next character, word, line, sentence, paragraph, page, whole document, or parts of a document
- Allows the user to control the announcement of punctuation, capitalization, colour, or other attributes of the text being read
- Allows the user to locate pockets of information on the screen
- Allows the user to navigate around the screen by moving the arrow keys as the application permits, and hear the text being read under the cursor as it is moved
- Allows the user to select the information to be read, how fast it should be read, and at what volume and pitch. In addition, the user is allowed to interrupt speech instantaneously
- Allows the user to search for attributes (blinking text, graphics, colour, and highlighted text)
- Alerts the user to unexpected or recurring changes in specified areas of the screen, such as error, status, and help messages
- Allows the user to define, store, and retrieve blocked-off areas of the screen.
- Allows the user to store and retrieve tailored configurations designed for specific applications
- Allows the user to redefine keystrokes normally used to perform screen access functions. This is necessary when the screen access software uses the same keystroke being used by the application software
- Compatibility with most popular voice synthesizers
- Compatibility with most popular Braille displays

- A special cursor for reviewing the screen without disturbing the caret or mouse pointer
- Full keyboard access for moving the mouse pointer without having to use a physical mouse (GW Micro).

(c) The value of computer technology for persons who are blind

According to Edwards and Lewis (1998:119), access to the printed word has long been recognised as a significant barrier to the integration of individuals who are blind into school and work environments. They emphasise that the advent of microprocessor technology in the 1960's and 1970's led to the speculation that these print-access problems would be resolved.

Based on their study of teachers in Florida who worked with learners who are blind, Edwards and Lewis (1998:150) maintain that "the use of access technologies can increase and individual's participation in school, personal management, and work situations. These technologies offer access to information, the lack of which has, for centuries, limited the full participation of individuals who are blind or who have low vision. The person who can use a computer has access to new worlds of information, and at levels of timeliness and independence that have never before been possible. If teachers are to meet learners' needs to be full participants in the 21st century, then they have to find ways to enhance their own knowledge and skills in assistive technologies. Only then will learners be able to take advantage of the potential personal, educational, and vocational benefits presented by these modern tools."

Pursuing the idea of access, Ashcroft (1984:108) states that "technology is one of the blind person's most powerful allies in overcoming the detrimental impact of blindness. In addition, technology can enable blind people to become more effective individuals, to function as capable, coping members of society, and to improve their own self-esteem."

(d) Disadvantages of computer technology for persons who are blind

Although technology has often been regarded as a panacea for a number of situations, there are those who are fully aware of its limitations for persons who are blind.

Maurer (2000:2) observes that "one of the most perpetually compelling issues in the field of blindness is technology and its power to enhance or frustrate the lives of

persons who are blind.”

Espinola and Croft (1992:46) argue that "with computers, the ability to access the printed word does not necessarily mean you can read the information with equal access." They add that "you cannot work comfortably with computers unless you understand how information is displayed on a monitor screen." This is particularly true as computer application programmes are designed to be visually attractive to sighted users. This means that when a user who is blind works with a new application, he/she first needs to understand how the information is being displayed, and next, how the access device and software assist in accessing the same information.

To illustrate this, Espinola and Croft (1992:45) observe that when a sighted person looks at a screen containing a spreadsheet, he or she knows, at once, how many columns there are, what their titles are, whether there are blank entries, etc. A glaring error can be spotted immediately. This same ability to examine a spreadsheet rapidly is not available using a screen access programme, as a speech user has to examine the screen in sections. Additionally, the user who is blind must know what he/she is looking for, and where that information may be found on the screen. Clearly, this means that the user should have a clear understanding of the screen layout. Therefore, the extent to which users who are blind are able to access the information on their computers will depend largely on their knowledge and effective use of their screen access technology.

It is for this reason that persons who are blind advocate for application software to be accessible to them. Pèpin (2000:204) captures the essence of access when he states, "the ideal access to information for blind users should be every bit as convenient, as dependable, as complete, and universal as it is in the sighted community. With the extraordinary technologies at our disposal, nothing less is acceptable."

Schroeder (2000:81) argues that "there are essentially two paradigms of blindness which have an impact on the future development of access technology. The first is that the persons who are blind, by virtue of their disability, are inherently less capable and less productive than others. Stated simply, this paradigm starts with the presumption that the way the sighted perform work is the best and most efficient method, and hence, the challenge to our technology is to seek methods by which the blind can perform work in the same manner as the sighted.

The second holds the view that blind people can compete alongside the sighted and achieve a status of real equality. In other words, if we believe that blind people can perform work as well as others, we will not be satisfied with our technology until it enables blind people to work competitively.

Under this paradigm, we set aside the methods by which the sighted function and concentrate on the product or outcome we desire. Essentially, the long-term challenge to our technological development is to find the best and most efficient ways for blind people to perform work, rather than continuing to seek to modify the methods used by the sighted."

Perhaps, the grim reality of access to technology is demonstrated forcefully by Herie (2000:14) who, in his capacity as the President of the World Blind Union, indicated that "The World Blind Union through its Committee on Technology raises the spectre of problems ahead in obtaining accessible and affordable technology because 80 percent of blind people do live in parts of the world where access to technology, electricity, or telephone lines is still a dream of the future. So either our talk of accessibility and affordability can remain as an oxymoron, or we can forge a blueprint that will make it a reality."

3.3 CONCLUSION

From the information in this chapter, it is evident that persons who are blind have a wider range of reading and writing media than was the case twenty years ago. Developments in the field of adaptive technology provide persons who are blind with greater access to information in print. However, the generally high cost of the media preclude the majority of persons who are blind from purchasing the preferred equipment.

An aspect that deserves serious attention is the absence of available research in South Africa on the various reading and writing media used by persons who are blind. In direct contrast is the wealth of documented research undertaken internationally. It is for this reason that the current study is crucial in contributing to the body of knowledge on the use of the various reading and writing media in South Africa.

CHAPTER 4

RESEARCH DESIGN

GOALS OF THIS CHAPTER

The goal of this chapter is to provide detailed information pertaining to the research design for the quantitative survey.

4.1 INTRODUCTION

Based on the rationale for and goals of the study discussed in chapter one, the literature review in chapter two focused both on issues pertaining to the development of tactual reading and writing media as part of an historical background to blindness, as well as the challenges faced by blind persons in education and employment. In chapter three, the literature review focused on an evaluation of the reading and writing media for their practical application for blind persons in education and employment.

In this chapter, detailed information pertaining to the research design will be included, paying particular attention to the following:

- a description of the quantitative approach to the survey;
- the use of a structured questionnaire survey design;
- measures to ensure validity and reliability, with emphasis on content validity and face validity;
- a description of the pilot study;
- data collection methods, detailing the procedures for the selection of the sample, the use of the questionnaire as the selected method for the collection of data, and administering the questionnaire; and
- data processing, using descriptive statistics that encompass frequencies and percentages.

Using the data collected, the results of the survey, together with supporting discussion, will be presented in chapter 5.

4.2 RESEARCH DESIGN

The research design refers to the plan and structure of the investigation used to obtain evidence to answer research questions (Schumacher & McMillan 1994:30). The design describes the procedures for conducting the study, including when, from whom, and under what conditions the data will be obtained. The purpose of the research design is to provide the most valid, accurate answers possible to research questions.

In this study, a quantitative approach with a survey design is used. The survey is the most commonly used descriptive method in educational research and gathers data at a particular point in time (Burns 2000:566). In survey research, the researcher selects a sample of subjects and administers a questionnaire or conducts interviews to collect data (Schumacher & McMillan 1994:36). Surveys are used frequently in educational research to describe attitudes, beliefs, opinions and other types of information. If surveys are administered correctly, sound information can be collected from a small sample that can be generalised to a large population (Creswell 1994; Schumacher & McMillan 1994).

A questionnaire developed by the researcher was the tool used for the structured interview in this survey to collect data that would assist in answering the questions formulated for the study. Questionnaires are a structured method of gathering information from respondents in a research study. Some of the characteristics of written questionnaires are that they seek more focused responses, and usually require participants to respond to items in structured categories. Questionnaires are usually less time consuming than interviews or observations (Darling & Baxter 1996:164).

The data from the quantitative survey will be descriptive, encompassing frequencies and percentages.

4.3 RESEARCH METHODS

4.3.1 Measures to ensure validity and reliability

According to Mouton (1996:109) validity may be viewed as being synonymous with best approximation to the truth. Mouton argues that "although scientists work under the

epistemic imperative or search for truth, there are various ontological and sociological constraints that seriously curtail the attainment of this ideal" (Mouton 1996:109). Ideally, the questionnaire as a measuring instrument constitutes a valid measure of the key concepts in the research question. Consequently, the outcome in a quantitative survey is a measuring instrument, and the predominant epistemological criterion is measurement validity (Mouton 1996:110). Furthermore, it has become customary to distinguish aspects or dimensions of measurement validity, such as face validity, construct validity, criterion and predictive validity.

To establish the content validity of the questionnaire, the draft questionnaire, which was developed by the researcher largely on the basis of his in-depth knowledge of and personal experience in the field of blindness, used as its guidelines the literature on the various reading and writing media, as described in chapter 3. In addition, the draft questionnaire was reviewed by an independent researcher, as well as a person who is knowledgeable about Braille and the technology used by persons who are blind. In each case, the draft questionnaire was reviewed for ease of use and completeness of the various reading and writing media used by persons who are blind.

The second dimension of measurement validity, namely, face validity, was also determined. An independent researcher studied the questionnaire to establish whether the items tested the construct that it was supposed to test. Thus, it was a matter of judgment.

4.3.2 Pilot study

Using the questionnaire, the researcher conducted a pilot study with four blind persons in employment. These four persons for the pilot study were drawn from the list of employed blind persons that had been compiled for the survey. As with the survey itself, the questionnaires were administered telephonically, with the duration of each questionnaire averaging twenty minutes. Additionally, the participants for the pilot study were not required to record their responses as this was done by the researcher.

Following the pilot study, minor changes were made to the questionnaire to allow for ease of use. As one of the participants in the pilot study had used a text-to-speech software that was not included in the initial list of text-to-speech software packages, this

software had to be included in item 7.4 of the questionnaire.

4.3.3 Data collection

4.3.3.1 Sample

In a survey, a researcher draws a sample from a larger pool of cases or elements. A sampling element is the unit of analysis in a population (Neuman 1997:202). The population for this study comprised currently employed blind persons in South Africa, as this would be the only group from the population of persons who are blind who would be able to respond to questions on their use of the reading and writing media in both education and employment.

Using purposive sampling, the researcher, in collaboration with the staff of Optima College, a training facility for adult blind persons, compiled a list of blind persons in employment. In preparing the list of persons who are blind, the aim was to deliberately obtain survey participants so that the sample would be as representative as possible of the relevant population. Representativeness is the underlying epistemic criterion of a valid sample (Mouton 1996:109).

Although 140 persons who are blind were identified, the final list consisted of the names of 109 persons in employment. The remaining 31 persons were either unavailable, or had changed their contact details. From the list of 109 persons, four were used for the pilot study. Consequently, the sample for the survey comprised 105 blind persons in employment.

4.3.3.2 Data collection method - the questionnaire

The questionnaire was the tool used in this survey to collect data that would assist in answering the questions formulated for the study. The researcher developed a comprehensive questionnaire comprising 96 multiple-choice questions (appendix a). Although detailed, the questions were simple and unambiguous, with the result that participants had no difficulty in understanding and responding to the questions. In addition, the categories used in the questionnaire were unambiguous and mutually exclusive.

The first six questions, (section A) which focused on biographical information, were used to elicit responses with regard to age, gender, residence, the age of onset of blindness, the type of school attended, and the province in which the school is situated.

In section two, questions were aimed at obtaining information on employment history.

Section three focused on questions pertaining to reading and writing tasks in the employment context, together with the employee's request for and acquisition of reading and writing media. Additionally, participants were asked whether the cost of the reading and writing media was raised as an issue by employers.

From section four to section twelve, questions focused on training in and the use of the following reading/writing media:

- Braille
- audiotapes
- talking books
- computers with speech output
- portable electronic notetakers
- Optacons
- refreshable Braille displays
- optical character recognition document readers (scanners)
- live readers and scribes.

In the final section, participants were asked to provide responses to questions on their preferred reading and writing media. In addition, questions focused on whether participants believed that there is a decline in the use of Braille and audiotapes, and whether computer technology would replace these media.

4.3.3.3 Administering the questionnaire

Given the comparatively small sample used for the survey, and acknowledging that not all questionnaires sent to potential survey participants would be completed and returned timeously, it was deemed necessary to administer the questionnaires telephonically. This would ensure that at the conclusion of the survey, there would be a total of 105

completed questionnaires. Additionally, telephonic interviews would ensure that the questionnaires are completed accurately and timeously. Furthermore, any question that is not clearly understood would be explained by those administering the questionnaire.

The questionnaires were administered by the 13 call centre agents at Optima College in Pretoria. These call centre agents were knowledgeable about the reading and writing media, with the result that they did not experience difficulties in administering the questionnaire. In addition, as not all blind persons participating in the survey would have ready access to a reading and writing medium, it was considered necessary for the call centre agents to enter the responses of the participants on special data sheets developed for the survey.

Prior to the interviews, discussions were held with the call centre instructors to familiarise them with the items in the questionnaire. Following the discussions, the instructors provided training to the 13 call centre agents, both on the questionnaire items, and on the procedures for administering the questionnaire, including the recording of responses. The training was deemed necessary in order to ensure that the thirteen call centre agents would adopt a uniform approach to administering the questionnaire.

Over a two-week period, the call centre agents conducted telephonic interviews with 105 blind persons in employment, with the duration of each interview averaging 20 minutes. The call centre agents were provided with copies of the questionnaire in both Braille and electronic formats. While they used the questionnaire in Braille to read the questions, the electronic version was used to record the responses by using a star (*) against the corresponding item. This procedure enabled the call centre agents who were blind to administer the questionnaires independently. This meant that the survey participants could give their full attention to the questions as they were not required to enter responses themselves.

The completed questionnaires were collected by the call centre instructors and forwarded to the researcher.

4.3.4 Data processing

One of the greatest challenges facing researchers is communicating their results to others. "It is one thing to have a study published in a learned journal where the readership is restricted to those who understand much of what is being described and can interpolate and extrapolate from parsimonious writings. The rest of the world needs more explicit information and descriptive statistics" (Black 1999:304). The descriptive aspect of statistics allows researchers to summarise large quantities of data using measures that are easily understood by an observer. Thus, descriptive statistics consist of graphical and numerical techniques for summarising data. That is, reducing a large mass of data to simpler, more understandable terms (Burns 2000:43).

To process the data obtained from the survey, an SPSS statistical programme was used. Although the questionnaire consisted of multiple-choice questions, an item analysis was not deemed necessary as the objective was not to standardise the questionnaire. In addition, the questions were not designed to include right or wrong answers.

Consistent with the thirteen sections in the questionnaire, thirteen tables were generated, containing descriptive statistics encompassing frequencies and percentages. These thirteen tables will form the basis of the discussions in the next chapter with regard to the analysis and interpretation of the data.

4.4 SUMMARY

This chapter included a discussion on the research design as the basis for an understanding of the plan and structure of the quantitative survey used to obtain evidence to answer the research questions formulated for this study. In the next chapter, the results of the survey, together with supporting discussion, will be presented.

CHAPTER 5

DATA ANALYSIS, FINDINGS AND INTERPRETATION

GOALS OF THIS CHAPTER

- To analyse and interpret the data obtained from the survey.
- To determine the impact of the various reading and writing media on the education and employment of persons who are blind.

5.1 INTRODUCTION

In this chapter, the responses gathered from the questionnaire used in the study are analyzed, and the results interpreted to show the significance and relevance of the gathered data to the goals of the study. As mentioned in chapter four, a comprehensive questionnaire for blind persons in employment was developed by the researcher to gather relevant data that would answer the questions formulated in this study. The data collected from the 96 items comprising the questionnaire are presented in thirteen tables in order to report the frequencies and percentages of responses and their distribution over the various variables studied. In addition, the data from the various tables are supported by detailed explanation and discussion.

The general aim of this chapter is to determine the impact of the various reading and writing media on the education and employment of persons who are blind. In particular, the quantitative study aimed to determine the following:

- (a) biographical data of respondents
- (b) the employment history of respondents
- (c) the way persons who are blind handle reading and writing tasks in the context of their employment
- (d) the views of persons who are blind on the following reading and/or writing media:
 - Braille

- audiotapes
 - talking books
 - computers with speech output
 - portable electronic notetakers
 - the optacon
 - optical character recognition document readers (scanners)
 - refreshable Braille displays
 - live readers and scribes
- (e) their personal preferences regarding reading and writing media
- (f) their views on the media in which learners should receive instruction
- (g) their views on the role of braille and the extent to which computer technology could replace Braille.

5.2 BIOGRAPHICAL INFORMATION

The following Table (Table 1) presents biographical information in respect of the respondents surveyed:

Table 1: Biographical Information

Factor	Frequency	Percentage%
Age:		
20 yrs and younger	3	2.9
21-29	25	23.8
30-39	40	38.1
40-49	24	22.9
50-59	10	9.5
60+	3	2.9
Total	105	100.0
Sex:		
Male	60	57.1
Female	45	42.9
Total	105	100.0

Province in which respondents live:		
Gauteng	54	51.4
Free State	9	8.6
North West	1	1.0
Limpopo	6	5.7
Western Cape	10	9.5
Eastern Cape	4	3.8
Mpumalanga	2	1.9
KwaZulu-Natal	19	18.1
Total	105	100.0
When respondent became blind		
Birth	39	37.1
Between birth and starting school	26	24.8
During primary school	15	14.3
During secondary school	13	12.4
While employed	12	11.4
Total	105	100.0
Type of school respondent attended:		
Special school	88	83.8
Ordinary school	17	16.1
Total	105	100.0
Province in which school is situated:		
Gauteng:	13	12.4
Free State	6	5.7
Limpopo	10	9.5
Western Cape	46	43.8
Eastern Cape	5	4.8
KwaZulu-Natal	25	23.8
Total	105	100.0

The sample of blind persons in employment was drawn from all provinces of South Africa, except the Northern Cape, as no referrals for the survey had been received from this province. The above table also indicates that in the context of employment, the 105 respondents surveyed (60 males and 45 females) span all age groups, with persons in the 30-39 age group constituting the majority at 38,1%.

The fact that the sample of respondents surveyed consisted of both congenital and adventitiously blinded persons is significant, as many writers, notably Tobin (1998), Lowenfeld (1983), and Best (1992), when speaking of the onset of blindness, emphasise that in the population of persons who are blind, there would be those who are congenitally blind, and those who are adventitiously blinded.

With regard to the question on the type of school attended, it is not surprising, based on the data from the survey, and the situation pertaining to education in South Africa, that

the majority of respondents (84%) attended special schools. Firstly, 65 of the 105 respondents were either congenitally blind, or became blind during the period between birth and attending school, suggesting that they would invariably attend a special school. Secondly, as the practice of inclusive education has not been fully implemented in South Africa, the number of learners who are blind attending ordinary schools is low.

5.3 EMPLOYMENT HISTORY

The following table reflects the data with regard to the employment history of the respondents surveyed:

Table 2: Employment History

Factor	Frequency	percentage %
Type of employment:		
Full-time employment	93	88.6
Part-time employment	12	11.4
Total	105	100.0
Years in current position:		
3yrs or less	33	31.4
4-6 yrs	21	20.0
7-9 yrs	19	18.1
10-12 yrs	6	5.7
13-15 yrs	9	8.6
More than 15 yrs	17	16.2
Total	105	100.0
Category of current employment:		
Self-employed	11	10.5
Employed in NGO	31	29.5
Employed in public service	39	37.1
Employed at school	3	2.9
Employed in higher education	3	2.9
Employed in commercial sector	14	13.3
Employed in legal field	2	1.9
Employed in industry	2	1.9
Total	105	100.0
Province of organisation:		
Gauteng	57	54.2
Free State	9	8.6
North West	2	1.9
Limpopo	3	2.9
Western Cape	10	9.5
Eastern Cape	5	4.8
Mpumalanga	2	1.9
KwaZulu-Natal	17	16.2
Total	105	100.0

It is generally accepted that obtaining and maintaining employment is a benchmark of adult status and self-esteem. Therefore, given the extremely competitive economic environment, compounded by the reluctance of many employers to employ persons who are blind, the high percentage of blind persons in full-time employment as reflected in the above table, is encouraging. Equally encouraging is the fact that approximately 10% of the respondents are in self-employment, indicative of their need to explore alternative avenues of employment. However, of great concern is the fact that despite the introduction of the Employment Equity Act (South Africa 1998), only 1,9% of those surveyed indicated that they were employed in industry.

Predictably, as comparatively more employment opportunities are available in Gauteng, 51,4% of the respondents reported that they were employed in Gauteng Province.

With specific reference to the number of years in their current employment, Table 2 indicates that the majority of respondents occupied their current positions for 4 years or more, indicative of the need to obtain and maintain a job.

5.4 READING/WRITING TASKS

The following table contains data on the reading/writing tasks of the respondents surveyed. The emphasis is on whether the requested adaptive technology was received, and whether the cost of adaptive technology was raised as an issue by employers.

Table 3: Reading/Writing Tasks

Factor	Frequency	Percentage %
Did you request specific adaptive technology?		
No	39	37.1
Yes	66	62.9
Total	105	100.0

Did you request: Perkins Brailier?		
No	70	66.7
Yes	35	33.3
Total	105	100.0
Did you request an electronic Braille Embosser?		
No	88	83.8
Yes	17	16.2
Total	105	100.0
Did you request a portable electronic Notetaker?		
No	89	84.8
Yes	16	15.2
Total	105	100.0
Did you request an Optacon?		
No	103	98.1
Yes	2	1.9
Total	105	100.0
Did you request a computer with speech output?		
No	60	57.1
Yes	45	42.9
Total	105	100.0
Did you request: OCR scanner?		
No	91	86.7
Yes	14	13.3
Total	105	100.0
Did you request: audiocassette recorder?		
No	88	83.8
Yes	17	16.2
Total	105	100.0
Did you request refreshable Braille display?		
No	99	94.2
Yes	6	5.7
Total	105	100.0
Did you receive Perkins Brailier?		
No	40	38.1
Yes	36	34.3
Not applicable	29	27.6
Total	105	100.0
Did you receive: electronic Braille embosser?		
No	48	45.7
Yes	16	15.2
Not applicable	41	39.0
Total	105	100.0
Did you receive computer with speech output?		
No	45	42.9
Yes	40	38.1
Not applicable	20	19.0
Total	105	100.0

Did you receive: portable electronic notetaker?		
No	58	55.2
Yes	14	13.3
Not applicable	33	31.4
Total	105	100.0
Did you receive an Optacon?		
No	56	53.3
Yes	5	4.8
Not applicable	44	41.9
Total	105	100.0
Did you receive: OCR scanner?		
No	60	57.1
Yes	7	6.7
Not applicable	38	36.2
Total	105	100.0
Did you receive: audiocassette recorder?		
No	56	53.3
Yes	16	15.2
Not applicable	33	31.4
Total	105	100.0
Did you receive: refreshable Braille display?		
No	60	57.1
Yes	5	4.8
Not applicable	40	28.6
Total	105	100.0
Was the cost of adaptive technology an issue with your employer?		
No	61	58.1
Yes	23	21.9
Not applicable	21	20.0
Total	105	100.0

Based on the data in Table 3, although 62,9% of respondents requested specific adaptive technology from their respective employers, these were mainly for computers with speech output, or for Perkins Brailers. Consistent with this, a greater number of respondents reported receiving Perkins Brailers and computers with speech output from their employers.

From the information in Table 3, it is possible that the respondents surveyed were either unfamiliar with some of the media, or were reluctant to request specific adaptive technology. Alternately, they may not have considered it necessary to request specific adaptive technology, believing that the technology would form part of the process of reasonable accommodation, and that they would receive the necessary technology as a *fait accompli*. Additionally, the fact that 58,1% of respondents reported that the cost of

adaptive technology was not raised as an issue by their respective employers does not indicate conclusively that the employers concerned were either willing or able to provide the technology.

5.5 BRAILLE AS A READING AND WRITING MEDIUM

Table 4: Braille as a Reading/Writing Medium

Factor	Frequency	Percentage %
Are you able to read:		
Uncontracted Braille	6	5.7
Contracted Braille	6	5.7
Both	90	85.7
None of the above	3	2.9
Total	105	100.0
Do you prefer reading:		
Uncontracted Braille	10	9.5
Contracted Braille	62	59.0
Both	26	24.8
None of the above	7	6.7
Total	105	100.0
How often do you read Braille?		
Never	6	5.7
Sometimes	28	26.7
Often	71	67.6
Total	105	100.0
How often do you receive Braille material?		
Never	21	20.0
Sometimes	36	34.3
Often	48	45.7
Total	105	100.0
Do you receive Braille material from: SA Library for the blind?		
No	54	51.4
Yes	51	48.6
Total	105	100.0
Do you receive Braille material from: Braille Services?		
No	50	47.6
Yes	55	52.4
Total	105	100.0
Do you receive Braille material from: Pioneer Printers?		
No	83	79.0
Yes	22	21.0
Total	105	100.0

Do you receive Braille material from SA National Council for the Blind?		
No	68	64.8
Yes	37	35.2
Total	105	100.0
Are you able to write in:		
Uncontracted Braille	10	9.5
Contracted Braille	7	6.7
Both	86	81.9
None of the above	2	1.9
Total	105	100.0
Do you prefer to write in:		
Uncontracted Braille	13	12.4
Contracted Braille	62	59.0
Both	20	19.0
None of the above	10	9.5
Total	105	100.0
Are you able to use slate and stylus to write Braille?		
No	32	30.5
Yes	73	69.5
Total	105	100.0
How often do you use slate and stylus to write Braille?		
Never	55	52.4
Sometimes	35	33.3
Often	15	14.3
Total	105	100.0
Did you receive training in the use of slate and stylus?		
No	54	51.4
Yes	51	48.6
Total	105	100.0
Are you able to use Perkins Braille to write Braille?		
No	5	4.8
Yes	100	95.2
Total	105	100.0
How often do you use Perkins Braille to write Braille?		
Never	11	10.5
Sometimes	29	27.6
Often	65	61.9
Total	105	100.0
Did you receive training in the use of Perkins Braille?		
No	11	10.5
Yes	94	89.5
Total	105	100.0

Do you think that the use of Braille has helped you at school?		
No	4	3.8
Yes	91	86.7
Not applicable	10	9.5
Total	105	100.0
Do you think that Braille has helped you in higher education?		
No	9	8.6
Yes	78	74.3
Not applicable	18	17.1
Total	105	100.0
Do you think that the use of Braille has helped you in current employment?		
No	14	13.3
Yes	83	79.0
Not applicable	8	7.6
Total	105	100.0

The data in Table 4 indicates a high percentage of Braille readers among the respondents surveyed, with a total of 97,1% being able to read either uncontracted or contracted Braille. In addition, the preference of 59,0% of respondents for material in contracted Braille is in sharp contrast to the views of writers such as Harley (1979), and Lorimer (1983), who maintain that contractions in Braille are complex, suggesting that persons who are blind would experience difficulties in reading and writing contracted Braille.

Although not conclusive, the data from the survey indicates that in South Africa, Braille as a reading and writing medium continues to be used extensively by persons who are blind. This is in sharp contrast to the situation in the United States of America, where, according to Johnson (1996:276), and Schroeder (1996:136), there is growing concerns regarding the perceived decline in the use of Braille.

Notwithstanding this, the data in Table 4 demonstrates that persons who are blind do not make maximum use of the providers of Braille material in South Africa. For example, only 48,6% of respondents indicated that they obtained material in Braille from the South African Library for the Blind, 52,4% from Braille Services, 35,2% from the South African National Council for the Blind, and 21,0% from Pioneer Printers.

With regard to writing in Braille, 59,0% of respondents indicated their preference for

contracted Braille. There is therefore a correlation between the preferences of reading and writing in contracted Braille, with preferences in both categories achieving a 59,0%.

Based on the data in Table 4, it is evident that the Perkins Brailier as a writing device is preferred to the slate and stylus. A possible explanation for this may be that while only 48,6% of respondents received training in the use of the slate and stylus, 89,5% of respondents had received training in the use of the Perkins Brailier.

On the question of the value of Braille in the context of school, higher education and current employment, the information in Table 4 reflects a positive impact, with 86,7% of respondents reporting the greatest benefit of Braille during their schooling. In addition, while 74,3% of respondents mentioned that Braille had helped them in higher education, 79,0% of respondents indicated that Braille was of benefit to them in their employment.

5.6 AUDIOTAPES

The following table captures data on responses pertaining to audiotapes.

Table 5: Audiotapes

Factor	Frequency	Percentage %
Do you read material on audiotape?		
No	30	28.6
Yes	75	71.4
Total	105	100.0
How often do you read material on audiotape?		
Never	27	25.7
Sometimes	35	33.3
Often	43	41.0
Total	105	100.0
Do you use audiotape to record documents at work?		
No	77	73.3
Yes	28	26.7
Total	105	100.0
Do you use audiotape to record meeting proceedings at work?		
No	77	73.3
Yes	28	26.7
Total	105	100.0

Do you receive audiotapes from: Tape Aids for the Blind		
No	37	35.2
Yes	68	64.8
Total	105	100.0
Do you receive audiotapes from: SA Library for the Blind?		
No	69	65.7
Yes	36	34.3
Total	105	100.0
Do you receive audiotapes from: Pioneer Printers?		
No	89	84.8
Yes	16	15.2
Total	105	100.0
Do you think that the audiotope has helped you at school?		
No	33	31.4
Yes	53	50.5
Not applicable	19	18.1
Total	105	100.0
Do you think that the use of audiotope has helped you in higher education?		
No	18	17.1
Yes	66	62.9
Not applicable	21	20.0
Total	105	100.00
Do you think that the use of audiotope has helped you in current employment		
No	34	32.4
Yes	47	44.8
Not applicable	24	22.8
Total	105	100.0

Although 71,4% of respondents indicated that they read material on audiotope, it is interesting to note that while organisations such as the South African Library for the Blind and Pioneer Printers make available material on audiotope, the majority of respondents (64,8%) received material on audiotope from Tape Aids for the Blind, as opposed to 34,3% from the South African Library for the Blind. Additionally, based on information contained in Table 5, it is evident that respondents do not use audiotapes to record documents at work, or to record the proceedings of meetings. A possible explanation for this may be that many persons who are blind are not employed in positions that require them to attend meetings or to record documents.

With specific reference to the value of audiotapes for persons who are blind, the data in Table 5 suggests that audiotapes were not used extensively as a reading or recording

medium in the context of school and employment. However, significantly more use was made of audiotapes in higher education, as indicated by 62,9% of respondents in this regard. This may be due to the fact that learners in higher education are expected to read more extensively, and since only a limited number of textbooks is available in Braille, the need to record prescribed and reference textbooks on audiotape is crucial.

5.7 TALKING BOOKS

Table 6: Talking Books

Factor	Frequency	Percentage %
Are you aware of digital talking books?		
No	47	44.8
Yes	58	55.2
Total	105	100.0
Do you receive digital talking books?		
No	91	86.7
Yes	14	13.3
Total	105	100.0
In which format do you receive talking books?		
On long playing records	2	1.9
On audiotapes	14	13.3
On compact disk	6	5.7
Not applicable	83	79.0
Total	105	100.0

Although 55,2% of respondents indicated that they were aware of digital talking books, only a small number (13,3%) of respondents actually received digital talking books. Understandably, a significant number of respondents were not familiar with digital talking books, as this medium has only fairly recently been developed. Only when it is circulated widely in South Africa will it begin to be used more extensively as a reading medium.

5.8 COMPUTERS WITH SPEECH OUTPUT

Table 7: Computers with speech output

Factor	Frequency	Percentage %
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Are you able to use a computer with speech output?		
No	24	22.8
Yes	81	77.1
Total	105	100.0
How often do you use a computer with speech output?		
Never	26	24.8
Sometimes	24	22.8
Often	55	52.4
Total	105	100.0
Did you receive training in the use of computers with speech output?		
No	50	47.6
Yes	55	52.4
Total	105	100.0
Do you use Window-Eyes speech software in your computer?		
No	60	57.1
Yes	24	22.9
Not applicable	21	20.0
Total	105	100.0
Do you use Jaws speech software in your computer?		
No	34	32.4
Yes	54	51.4
Not applicable	17	16.2
Total	105	100.0
Do you use Hal speech software in your computer?		
No	71	67.6
Yes	7	6.7
Not applicable	27	25.7
Total	105	100.0
Do you use Windows Bridge speech software in your computer?		
No	74	70.5
Yes	4	3.8
Not applicable	27	25.7
Total	100.0	100.0
Do you use Duel speech software in your computer?		
No	75	71.4
Yes	2	1.9
Not applicable	28	26.7
Total	105	100.0
Do you use computer with speech output at work?		
No	50	47.6
Yes	51	48.6
Not applicable	4	3.8
Total	105	100.0

Do you think that the use of computers has helped you at school?		
No	29	27.6
Yes	25	23.8
Not applicable	51	48.6
Total	105	100.0
Do you think that the use of computers has helped you in higher education?		
No	20	19.0
Yes	41	39.0
Not applicable	44	41.9
Total	105	100.0
Do you think that the use of computers with speech output has helped you in current employment?		
No	19	18.1
Yes	54	51.4
Not applicable	32	30.5
Total	105	100.0

Computers with speech output have become an integral part of the lives of many persons who are blind. This is evident from the large number of respondents who indicated that they used computers with speech output, either sometimes or often. However, judging from the fact that just over 50% of the respondents indicated that they received training in the use of computers, it is perhaps understandable why there is a low percentage of blind persons (23,8% and 39,0%) who mentioned that they benefited from the use of computers at school and in higher education respectively. In addition, while 77,1% of respondents indicated that they were able to use computers with speech output, only 48,5% used their computer skills in the context of their employment. This may be attributed to several factors, including the possibility that they use other media, that their work does not necessitate the use of computers with speech output, or that they were not provided with computers at work.

Although there are several text-to-speech software packages available today, the data from the survey indicates a greater preference for JAWS, the acronym for Job Access with Speech, with 22,8% of the users opting for Window-Eyes.

5.9 PORTABLE ELECTRONIC NOTETAKERS

Table 8: Portable Electronic Notetaker

Factor	Frequency	Percentage %
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Do you use portable electronic notetaker?		
No	72	68.6
Yes	31	29.5
Not applicable	2	1.9
Total	105	100.0
How often do you use portable electronic notetaker?		
Never	75	71.4
Sometimes	11	10.5
Often	19	18.5
Total	105	100.0
Did you receive training in the use of portable electronic notetaker?		
No	95	90.5
Yes	6	5.7
Not applicable	4	3.8
Total	105	100.0
Do you use portable electronic notetaker in your current employment?		
No	73	69.5
Yes	26	24.8
Not applicable	6	5.7
Total	105	100.0
Do you think that the use of portable electronic notetaker has helped you at school?		
No	39	37.1
Yes	5	4.8
Not applicable	61	58.1
Total	105	100.0
Do you think that the use of portable electronic notetaker has helped you in higher education?		
No	34	32.4
Yes	11	10.5
Not applicable	60	57.1
Total	105	100.0
Do you think that the use of portable electronic notetaker has helped you in current employment?		
No	30	28.5
Yes	25	23.8
Not applicable	50	47.6
Total	105	100.0

Although portable electronic notetakers with speech output have been in use for several years, the data in Table 8 indicates that only a limited number of persons who are blind use this medium in their employment. Moreover, as only a few respondents mentioned that notetakers benefited them in school and higher education, it would suggest that

these devices did not feature prominently in schools and higher education institutions.

As with computers with speech output, only a limited number of respondents mentioned that they received training in the use of portable electronic notetakers, highlighting a gap in this regard, and the consequent need for increased training opportunities at schools and adult training centres.

5.10 THE OPTACON

Table 9: The Optacon

Factor	Frequency	Percentage %
Do you use an Optacon?		
No	90	85.7
Yes	7	6.7
Not applicable	8	7.6
Total	105	100.0
How often do you use the Optacon?		
Never	95	90.5
Sometimes	5	4.8
Often	5	4.8
Total	105	100.0
Did you receive training in the use of the Optacon?		
No	79	75.2
Yes	18	17.1
Not applicable	8	7.6
Total	105	100.0
Do you use an Optacon in current employment?		
No	93	88.6
Yes	2	1.9
Not applicable	10	9.5
Total	105	100.0
Do you think that the Optacon is a useful reading medium for blind persons?		
No	44	41.9
Yes	23	21.9
I do not know	38	36.2
Total	105	100.0
Do you think that the use of the Optacon has helped you in school?		
No	33	31.4
Yes	4	3.8
Not applicable	68	64.8
Total	105	100.0

Do you think that the use of the Optacon has helped you in higher education?		
No	36	34.3
Yes	3	2.9
Not applicable	66	62.8
Total	105	100.0
Do you think that the use of the Optacon has helped you in current employment?		
No	38	36.2
Yes	2	1.9
Not applicable	65	61.9
Total	105	100.0

Although the Optacon may be invaluable as an aid to scanning print material where a large amount of reading is not required, judging from the data in Table 9, only a limited number of respondents (6,6%) mentioned that they use this medium. This is not surprising, since only 17,1% of the respondents mentioned that they received training in the use of this medium. However, even with training, the comparatively slow reading rate with the Optacon is perhaps a major reason for its unpopularity. This is consistent with the view expressed by Best (1992:91) who maintains that even experienced users of the Optacon find that they can only achieve reading speeds of 80-100 words per minute.

With specific reference to the use of the Optacon in the workplace, it is understandable that, given the limited number of trained Optacon users, its use in the workplace would be greatly reduced. This is illustrated by the very low percentage (1,9%) of respondents who use the Optacon in their current employment.

Based on the data in Table 9, it is evident that the Optacon is not considered a useful reading medium by persons who are blind. Additionally, given the limited use of the Optacon at school and in higher education, the benefits of this medium for persons who are blind are understandably low.

5.11 OCR SCANNERS

Table 10: Optical Character Recognition: Document Reader (OCR Scanner)

Factor	Frequency	Percentage %
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Do you use OCR scanner?		
No	75	71.4
Yes	22	21.0
Not applicable	8	7.6
Total	105	100.0
How often do you use OCR scanner?		
Never	75	71.4
Sometimes	9	8.6
Often	21	20.0
Total	105	100.0
Did you receive training in the use of OCR scanner?		
No	90	85.7
Yes	6	5.7
Not applicable	8	7.6
Total	105	100.0
Do you use OCR scanner in current employment?		
No	76	72.4
Yes	20	19.0
Not applicable	9	8.6
Total	105	100.0
Do you think that the use of the OCR scanner has helped you at school?		
No	33	31.4
Yes	3	2.9
Not applicable	69	65.7
Total	105	100.0
Do you think that the use of the OCR scanner has helped you in higher education?		
No	27	25.7
Yes	13	12.4
Not applicable	65	61.9
Total	105	100.0
Do you think that the use of OCR scanner has helped you in current employment		
No	29	27.6
Yes	18	17.1
Not applicable	58	55.2
Total	105	100.0

Although the OCR scanner has potential benefits for persons who are blind with regard to their independent access to printed materials, the data in Table 10 indicates that these devices are used by a limited number of blind persons in employment. The situation is compounded by the fact that, based on the information in Table 10, only 5,7% had received any training in the use of these devices, indicating that OCR scanners did not

feature prominently in the training programmes at schools or adult training centres. It is therefore understandable that the benefits of OCR scanners in schools, higher education institutions and employment would be minimal.

A further possible reason for the limited use of OCR scanners may be that having a scanner also means having a computer system with appropriate OCR software, which is directly linked to cost. Additionally, even when print material is scanned, it may have to be edited, posing an additional difficulty, as the scanned text may have to be compared with the original.

5.12 REFRESHABLE BRAILLE DISPLAYS

Table 11: Refreshable Braille Display

Factor	Frequency	Percentage %
Do you use refreshable Braille display?		
No	90	85.7
Yes	6	5.7
Not applicable	9	8.6
Total	105	100.0
How often do you use refreshable Braille display?		
Never	99	94.3
Sometimes	4	3.8
Often	2	1.9
Total	105	100.0
Did you receive training in the use of the refreshable Braille display?		
No	96	91.4
Yes	1	1.0
Not applicable	8	7.6
Total	105	100.0
Do you use refreshable braille display in current employment?		
No	90	85.7
Yes	4	3.8
Not applicable	11	10.5
Total	105	100.0
Do you think that the refreshable Braille display has helped you at school?		
No	35	33.3
Yes	8	7.6
Not applicable	62	59.0
Total	105	100.0

Do you think that the refreshable Braille display has helped you in higher education?		
No	31	29.5
Yes	2	1.9
Not applicable	72	68.6
Total	105	100.0
Do you think that the use of the refreshable Braille display has helped you in current employment?		
No	32	30.5
Yes	5	4.8
Not applicable	68	64.8
Total	105	100.0

While refreshable Braille displays provide the user who is blind with immediate feedback on information entered in or displayed on the computer, they are generally beyond the financial reach of most persons who are blind. This is evident from the data in table eleven, which indicates that only a small number of blind persons (5,7%) make use of refreshable Braille displays. The limited use of refreshable Braille displays is further demonstrated by the fact that only 3,8% of respondents used this medium in their current employment.

Admittedly, the decision to use a particular device is often dependent on the training received. Based on the data in Table 11, only 1 person had received training in the use of refreshable Braille displays, highlighting once again the need for training in the various media.

5.13 LIVE READERS AND SCRIBES

The following table (table twelve) presents data on the use of live readers and scribes.

Table 12: Live Readers and Scribes

Factor	Frequency	Percentage %
Do you use a live reader?		
No	25	23.8
Yes	73	69.5
Not applicable	7	6.7
Total	105	100.0

How often do you use a live reader?		
Never	27	25.7
Sometimes	36	34.3
Often	42	40.0
Total	105	100.0
Do you use live readers at work?		
No	41	39.0
Yes	55	52.4
Not applicable	9	8.6
Total	105	100.0
How often do you use live readers at work?		
Never	44	42.8
Sometimes	34	32.4
Often	27	25.7
Total	105	100.0
Do you use a scribe?		
No	60	57.1
Yes	39	37.1
Not applicable	6	5.7
Total	105	100.0
How often do you use a scribe?		
Never	61	58.1
Sometimes	25	23.8
Often	19	18.1
Total	105	100.0
Do you think that the use of live readers and scribes has helped you at school?		
No	32	30.5
Yes	38	36.2
Not applicable	35	33.3
Total	105	100.0
Do you think the use of live readers and scribes has helped you in higher education?		
No	22	21.0
Yes	52	49.5
Not applicable	31	29.5
Total	105	100.0
Do you think that the use of live readers and scribes has helped you in current employment?		
No	25	23.8
Yes	52	59.5
Not applicable	28	26.7
Total	105	100.0

Many persons who are blind rely either totally or partly on live readers for some or all of their reading needs. This is illustrated by the data in Table 12, which indicates that 74,2% of respondents used live readers, either sometimes or often. However, only

52,3% of the respondents indicated that they used live readers at work, possibly because such a service was not available to them, or that the nature of their work did not require the use of a live reader.

In direct contrast, 41,9% of respondents indicated that they used scribes, either sometimes or often, suggesting that persons who are blind are more confident in completing their own writing tasks.

Of significance is the fact that a greater number of respondents indicated that they benefited more from the use of live readers and scribes in higher education and employment than at school. This is understandable, particularly in the context of higher education, where learners often request the assistance of fellow learners to read study material or textbooks that are only available in print.

5.14 PREFERENCES OF RESPONDENTS

Table 13: Preference of Respondents

Factor	Frequency	Percentage %
Which medium do you prefer for reading?		
Braille	56	53.3
Audiotape	4	3.8
Computer with speech output	35	33.3
Portable electronic notetaker	5	4.8
Optacon	1	1.0
OCR scanner	3	2.9
Live reader	1	1.0
Total	105	100.0
Which medium do you prefer for writing/recording?		
Slate and stylus	2	1.9
Perkins Braille	34	32.4
Audiotape	5	4.8
Computer with speech output	55	52.4
Portable electronic notetaker	9	8.6
Total	105	100.0

Should school learners receive instruction in the use of the slate and stylus?		
No	50	47.6
Yes	53	50.5
I do not know	2	1.9
Total	105	100.0
Should school learners receive instruction in the use of the Perkins brailier?		
No	5	4.8
Yes	97	92.4
I do not know	3	2.8
Total	105	100.0
Should school learners receive instruction in the use of audiotapes?		
No	30	28.6
Yes	67	63.8
I do not know	8	7.6
Total	105	100.0
Should school learners receive instruction in computers with speech output?		
No	2	1.9
Yes	100	95.2
I do not know	3	2.8
Total	105	100.0
Should school learners receive instruction in portable electronic notetakers?		
No	24	22.9
Yes	66	62.9
I do not know	15	14.3
Total	105	100.0
Should school learners receive instruction in the Optacon?		
No	35	13.3
Yes	45	73.3
I do not know	25	23.9
Total	105	100.0
Should school learners receive instruction in OCR scanner?		
No	14	13.3
Yes	77	73.3
I do not know	14	13.3
Total	105	100.0
Should school learners receive instruction in refreshable braille display?		
No	22	21.0
Yes	63	60.0
I do not know	20	19.0
Total	105	100.0

Do you think there is a decline in the use of Braille?		
No	36	34.3
Yes	49	46.7
I do not know	20	19.0
Total	105	100.0
There is a decline in the use of Braille because:		
Fewer blind persons use Braille	15	14.3
Limited material is available in Braille	9	8.6
Greater use is made of computers	37	35.2
There is no decline in the use of Braille	44	41.9
Total	105	100.0
Will computers replace Braille?		
No	80	76.2
Yes	16	15.2
I do not know	9	8.6
Total	105	100.0
Computers will not replace Braille because:		
Braille is an affordable medium	53	50.5
Braille provides direct access to information	20	19.0
Braille is easier to learn than other Media	11	10.5
Technology will replace Braille	21	20.0
Total	105	100.0
Will computers replace audiotapes?		
No	46	43.8
Yes	44	41.9
I do not know	15	14.3
Total	105	100.0
Computers will not replace audiotapes because:		
Fewer blind persons use Audiotapes	6	5.7
Greater use is made of computers with speech output	44	41.9
The audiotape will not be replaced by Computers	55	52.4
Total	105	100.0

The data in this Table provides information on the preferences of respondents in respect of the use of the various reading and/or writing media.

With regard to a preferred reading medium, it is evident from the data in Table 13 that over half (53,3%) of the respondents surveyed preferred Braille, with computers with speech output being the second choice at 33,3%. Surprisingly, while the data in Table 5 indicates that 71,4% of respondents read material on audiotape, and while the data in Table 12 indicates that a significantly high percentage of respondents (74,2%) used live readers, it is implied from the data in Table 13 that respondents preferred direct and

independent access to reading material through Braille, or, alternately, through a computer with speech output.

In terms of a preferred device for writing or recording, the situation is reversed, with computers with speech output being preferred by 51,4% of the respondents, followed by the Perkins Braille at 32,4%. This preference is perhaps not surprising, given the computer's wordprocessing capabilities, including editing, formatting, spell checking, and copying and pasting.

On the question of whether learners who are blind should receive instruction in the use of the various reading and/or writing media, the data in Table 13 indicates overwhelming support for instruction in the use of Perkins Braille and computers with speech output, demonstrating once again the strong preference for Braille and computers with speech output. Notwithstanding this, although the data indicates lower support for the other media, with the slate and stylus and the Optacon being placed at the bottom of the training list, what emerges forcefully is the support for the need to provide instruction in the use of the various reading and writing media.

An analysis of the data in Table 13 indicates that the respondents were divided on whether or not there is a decline in the use of Braille. However, as their responses were based on their opinions rather than on empirical evidence, it would not be possible to draw any firm conclusions.

With regard to the item on computers versus Braille, a convincing 76,2% of respondents believed that computers will not replace Braille. This underscores the observation made by Arter (1997a:152) that while there has been a popular misconception that Braille as a medium would be made obsolete by advances in technology, technology has in fact, increased the availability of Braille. Programmes which can quickly translate print files into Grade 1 or Grade 2 Braille for downloading to Braille embossers are now widely available.

On the question of whether computers will replace audiotapes, respondents were almost equally divided on this issue. Again, as their responses were based on their opinions rather than on empirical evidence, it would not be possible to draw any firm conclusions.

5.15 CONCLUSION

While the foregoing has essentially been an analysis of the data in the thirteen tables, the question that emerges is: what impact do the various reading and writing media have on the education and employment of persons who are blind?

In summary, the findings demonstrate that Braille as a reading and writing medium had the greatest impact, both in terms of education and employment. This is evident from the 86,7% of respondents who experienced the greatest benefit of Braille during their schooling. In addition, while 74,3% of respondents mentioned that Braille had helped them in higher education, 79,0% of respondents indicated that Braille was of benefit to them in their employment.

Although the computer with speech output was the medium of choice for writing tasks, the findings indicate that this medium had limited impact in the context of education, largely because just over 50% of the respondents indicated that they received training in the use of computers with speech output.

The findings indicate varying impact for the other media. For example, while the audiotape had little impact in school and employment, it had greater impact in higher education. In addition, the findings suggest that there was greater impact of live readers and scribes in higher education and employment than at school. In direct contrast, as most respondents were either unaware of, or did not receive training in the use of the notetaker, Optacon, refreshable Braille display and OCR scanner, these media appear to have had minimal impact on the education and employment of persons who are blind. However, it must be emphasised that as 35,2% of the respondents were 40 years or older, they would clearly not have been exposed to many of the media at school.

A summary of the findings, together with recommendations based on the findings, is included in chapter six. The chapter also provides guidelines for an integrated reading and writing model that uses the various reading and writing media.

CHAPTER 6

SUMMARY, RECOMMENDATIONS AND CONCLUSIONS

GOALS OF THIS CHAPTER

- To provide a summary of the findings from the survey, and to offer recommendations based on the findings.
- To provide guidelines for an integrated reading and writing model.

6.1 INTRODUCTION

Using a quantitative approach with a survey design, the present study aimed to establish the impact of the different reading and writing media on the education and employment of persons who are blind. Each of the six chapters comprising the study were devoted to a specific aspect, thereby providing a logical development from the formulation of the research problem to the findings and recommendations.

In chapter 1, following a brief introduction and explanation of key concepts, the research problem was formulated, together with selected goals that would assist in highlighting the salient issues in the study. In addition, a brief description of the research design was presented.

The comprehensive literature review in chapter 2 focused both on issues pertaining to the development of tactual reading and writing media as part of an historical background to blindness, and the challenges faced by blind persons in education and employment.

Chapter 3 provided an evaluation of the various reading and writing media used by persons who are blind, highlighting their functioning, value and disadvantages.

In chapter 4, detailed information pertaining to the research design was included, paying particular attention to the following:

- a description of the quantitative approach to the survey;
- measures to ensure validity and reliability, with emphasis on content and face validity;
- a description of the pilot study;
- data collection methods, detailing the procedures for the selection of the sample, the use of the questionnaire as the selected method for the collection of data, and administering the questionnaire; and,
- data processing (using descriptive statistics) that encompasses frequencies and percentages.

In chapter 5, the responses gathered from the questionnaire used in the study were analyzed, and the results interpreted to show the significance and relevance of the gathered data to the goals of the study. The data collected from the 96 items comprising the questionnaire were presented in thirteen tables in order to report the frequencies and percentages of responses and their distribution over the various variables studied. In addition, the data from the various tables are supported by detailed explanation and discussion.

Chapter 6 provides a summary of the findings, together with recommendations, both for future research, and for an Integrated Reading and Writing Model. In addition, the chapter provides brief concluding remarks.

6.2 SUMMARY OF FINDINGS

Based on the goals listed in chapter 1 (1.6), as well as the data in the 13 tables in chapter 5, the following encapsulates the findings of the Present study:

6.2.1 The development of tactual reading and writing media

In tracing the development of tactual reading and writing media as part of an historical background to blindness, what emerges forcefully from the literature study in chapter 2 is that, prompted by their need to record material that they believed would be difficult to memorise, persons who were blind were largely instrumental in devising basic but creative tactual forms of reading and writing that they could use. However, the invention of the system of dots by Louis Braille marked a significant turning point in the

development of tactual forms of reading and writing, as it provided persons who are blind with an effective reading and writing medium. Perhaps the most significant aspect with regard to the development of a system of embossed dots is that while previous systems of reading and writing for persons who were blind focused on embossed Roman lettering, the critical insight of Louis Braille was that the fingers discriminate embossed dots more readily than the embossed line properties of ordinary letters.

6.2.2 Major challenges faced by blind persons in education and employment

Based on the discussion in chapter 2 (2.5), it is evident that learners who are blind face many challenges in the context of education and training. These challenges relate mainly to the inflexibility of the curriculum, and the dilemma concerning the reading and writing media in which learners who are blind should be taught. Essentially, persons who are blind are often regarded as a homogeneous group with similar needs. Consequently, the lack of understanding about blindness often results in persons who are blind not receiving the educational support they require.

With regard to employment, the findings from the present study indicate that despite the many challenges, compounded by an extremely competitive employment environment, persons who are blind are active participants in the world of work. The findings also indicate that, consistent with the emphasis on gender sensitivity in South Africa, women who are blind are also active participants in employment, thereby acknowledging their pivotal role in society. Of particular significance in terms of skills development is the fact that persons who are blind are employed in various categories of employment, and not restricted to telephony, as was the case in previous years. Additionally, the findings from the survey indicate that employees who are blind are provided with some adaptive technology that could potentially assist them with their employment tasks. This underscores the fact that many employers are adhering to the principle of Reasonable Accommodation for employees with disabilities.

6.2.3 Reading and writing media currently used by persons who are blind

With regard to the use of reading and writing media, the findings indicate that persons who are blind use a combination of different reading and writing media. However, what emerges forcefully is that a greater number of persons who are blind prefer Braille and

computers with speech output. In particular, the findings indicate that while Braille is the medium of choice for reading, computers with speech output are preferred when writing tasks are required. These findings are particularly significant as they counter the misconception that all persons who are blind use and/or prefer Braille for both reading and writing tasks. Moreover, the findings confirm that Braille is not the dominant medium as was previously thought, but rather an integral part of the array of reading and writing media used by persons who are blind. Equally important, the findings emphasise the importance of providing training in the various media.

At another level, the findings underscore the fact that in South Africa, Braille as a reading and writing medium continues to be used extensively by persons who are blind. This is contrary to the situation in the United States of America, where there are growing concerns regarding the perceived decline in the use of Braille.

With regard to computers, while the findings indicate that computers with speech output are the preferred writing medium, access to computers is not always provided. In the context of employment, this would suggest that persons who are blind would be at a decided disadvantage, as they would have to rely on the assistance of fellow workers.

Notwithstanding the decided preference for Braille and computers with speech output for reading and writing respectively, the findings indicate that the other media are used to a greater or lesser extent.

While audiotapes are used by many persons who are blind, presumably for leisure reading, the findings however demonstrate that their use in school and employment is limited, countering the notion often held that persons who are blind invariably make use of audiotapes.

With regard to live readers and scribes, the findings indicate that persons who are blind make greater use of live readers than scribes. A possible reason for this could be that there are more reading tasks than writing tasks. Additionally, while writing a document could be achieved with a preferred or available medium, not all documents can be accessed directly.

Although portable electronic notetakers are equipped with speech output, the findings from the survey demonstrate that their use by persons who are blind is limited, presumably because many persons who are blind are either not familiar with, or did not receive training in the use of notetakers.

The potential benefit of OCR scanners with regard to independent access to printed materials is widely acknowledged. However, the findings indicate that OCR scanners are used by a limited number of persons who are blind. A possible reason for the limited use of scanners is that having a scanner also means having a computer system with appropriate OCR and speech access software, which is directly linked to cost.

Additionally, not all documents can be scanned accurately, with the result that editing may often be required.

Clearly, the findings from the survey suggest that many of the respondents were either not familiar with, or trained in the use of some of the reading/writing media, particularly the Optacon, refreshable Braille display, and the talking book. This suggests that these media were not included in the training programmes at schools or adult training centres. Notwithstanding this, there is support for the need to provide instruction in the use of the various reading and writing media, highlighting the critical value and role of the various media. Furthermore, while persons who are blind appear to be convinced that computers will not replace Braille, they were, however, divided on whether there is a decline in the use of Braille, or whether computers would replace audiotapes.

6.2.4 The impact of the different reading and writing media on the education and employment of persons who are blind

Admittedly, the primary goal of the present study is to research the impact of the different reading and writing media on the education and employment of persons who are blind. In this regard, the findings demonstrate that Braille as a reading and writing medium had the greatest impact, both in terms of education and employment. This is evident from the 86,7% of respondents (Table 4) who experienced the greatest benefit of Braille during their schooling. In addition, while 74,3% of respondents (Table 4) mentioned that Braille had helped them in higher education, 79,0% of respondents (Table 4) indicated that Braille was of benefit to them in their employment.

With regard to the other media, the findings indicate varying impact. While the audiotape was not used extensively as a reading or recording medium in school and employment, thereby having little impact, significantly more use was made of this medium in higher education. In addition, the findings suggest that there was greater impact of live readers and scribes in higher education and employment than at school. Although the computer with speech output was the medium of choice for writing, the findings from the data in Table 7 indicate that this medium had limited impact in the context of education, largely because just over 50% (52,4%) of the respondents indicated that they received training in the use of computers with speech output.

In direct contrast to the impact of the afore-mentioned media, the notetaker, Optacon, refreshable Braille display and OCR scanner had minimal impact on the education and employment of persons who are blind. However, it must be emphasised that, based on the data from the survey, most respondents were either unaware of, or did not receive training in the use of these media.

6.3 IMPLICATIONS OF THE STUDY

One of the major implications from the findings of the present study is that schools that accommodate learners who are blind, as well as adult training centres, should be equipped with the various reading and writing media. Undoubtedly, this would depend on the availability of financial resources to purchase the various media. Moreover, there is an urgent need to ensure that learners who are blind receive adequate training in the use of the various reading and writing media, and that they are provided with opportunities to use these media in authentic contexts. Admittedly, while persons who are blind may choose to use a single medium or a combination of media, training in the use of the various media would provide them with wider options.

A further implication is that in order to provide learners with adequate training in the use of the various reading and writing media, educators must be skilled in the use of the media. Additionally, with specific reference to materials production for persons who are blind, educators would be confident and equipped to provide material in the formats preferred by learners, whether in Braille, audiotape, or electronic.

6.4 LIMITATIONS OF THE STUDY

As the present study focused on employed persons who are blind, the results of the study cannot be generalized to the whole population of persons who are blind. The study could therefore be expanded to include schools for learners who are blind, Braille production units, and Braille and audiotope libraries. Such a comprehensive study would provide valuable data on the use of the various reading and writing media in a variety of contexts.

6.5 RECOMMENDATIONS

Based on the findings of the study, the following recommendations are offered:

6.5.1 Future research

While the present study is valuable in establishing the impact of the various reading and writing media on the education and employment of persons who are blind, it is limited to those in employment. Further research could be undertaken to include schools that accommodate learners who are blind, Braille production units, Braille and audiotope libraries, and disability units at higher education institutions. Such a study would not only provide valuable information on training offered in the various reading and writing media, but would also establish the extent of the use of material in Braille, audiotope and electronic formats.

Essentially, given the dearth of research in South Africa on the various reading and writing media used by persons who are blind, significantly more research is required in this regard. Equally important, while research in the field of blindness undertaken in other parts of the world may be useful, research conducted in South Africa would be more meaningful and relevant.

6.5.2 The provision of preferred reading and writing media in the context of employment for persons who are blind

As discussed in chapter 2 (2.6.1), section 1 of the Employment Equity Act (1998:7) defines reasonable accommodation as "any modification or adjustment to a job or to the

working environment that will enable a person from a designated group to have reasonable access to or participate or advance in employment." Consequently, as persons who are blind belong to a designated group of persons with disabilities, they should be provided with reasonable accommodation in their employment, including the provision of needs-based reading and writing media.

Unquestionably, persons who are blind should be provided with the media with which they would be comfortable, and which would lead to their greater independence in performing work-related tasks. Equally important, while the provision of appropriate reading and writing media would be beneficial, arrangements must be made for on-site training where necessary. Such training would equip the employee who is blind with skills necessary for the effective functioning in the workplace.

6.5.3 The high cost of technology-based reading and writing media

While the advantages of the various reading and writing media for persons who are blind are generally recognised, the irony is that many of the media cannot be readily obtained as they are prohibitively expensive and beyond the means of the average person who is blind. Additionally, technology-based media are invariably available from a limited number of vendors, with the result that prices are generally not competitive.

Given the immense value of the reading and writing media for persons who are blind, Government subsidies should be made available for the purchase of adaptive technology that is intended for use, both in education institutions, and for employees who are blind. Additionally, to ensure that the cost of adaptive technology remains generally affordable for persons who are blind, restrictions should be imposed on the mark-up that may be added to the cost price. This would allow persons who are blind to use the media they prefer, and not be restricted to the media they can afford. An alternate form of assistance to persons who are blind may be a tax deduction on the purchase of adaptive technology.

6.5.4 An Integrated Reading and Writing Model

6.5.4.1 Background

Based on the findings of the survey, it is evident that many of the respondents were either not familiar with, or did not receive training in some of the reading and writing media, presumably because these media were not available at the school or training centre they attended. Consequently, given that many schools and training centres are gradually increasing their range of reading and writing media, and acknowledging the individual and collective value of the various reading and writing media, it would be important for instruction in the media to be provided to learners at schools and training centres. However, the findings also indicate that persons who are blind use a combination of reading and writing media, depending on the nature of the task or the availability of a particular medium. Consequently, it would be appropriate to provide training in the use of the various media. However, since specific media are often used in specific situations, and since many of the media are often used in conjunction with one another, for example: OCR scanners and computers, Braille and computers, and the Optacon and computers, the recommendation in this study is for an integrated approach to training. Essentially, this means that schools that accommodate learners who are blind, as well as training centres, should not provide separate instruction in the various media, but should employ an integrated model that focuses on holistic skills.

Applied in practice, this would mean, for example, that the Braille instructor would use audiotaped material in conjunction with Braille texts. Learners would listen to the audiotaped material, which would then be brailled. The Braille instructor would also provide instruction in the effective use of audiotapes, by focusing on special facilities, such as voice indexing, tone indexing and compressed speech.

The Braille instructor would work in collaboration with the computer instructor to provide training in the use of refreshable Braille displays. Furthermore, the Braille instructor would provide the computer instructor with material in Braille for application exercises during computer classes. Learners would be required to read the material in Braille and enter the information into the computer.

As an integral part of computer lessons, The computer instructor would combine lessons to include instruction in the use of OCR scanners. For practical application, learners would be required to scan texts from books or documents. The scanned documents would then be used to provide learners with editing, spellchecking, formatting and printing skills.

In view of their similarity to computers, portable electronic notetakers would also form an integral part of the lessons in computer classes. Learners would be trained to use portable electronic notetakers as stand-alone equipment, and as devices that can interface with computers to transfer information from the one device to the other.

Pursuing the principle of team-teaching, the Optacon instructor would work in close collaboration with the computer instructor. Learners would be trained, for example, to use the Optacon to obtain an idea of the layout of a computer screen. In addition, when editing a scanned document on the computer, the learner would use the Optacon to compare the scanned document with the original.

Clearly, the use of an Integrated Reading and Writing Model would ensure that learners who are blind receive skills in the use of the various media, rather than being restricted to a single medium. Equipped with the necessary skills to use the various media, learners would be able to adequately meet the demands of reading and writing tasks in higher education and employment.

However, even with the use of an integrated model, an important consideration is that learners who are blind should be given the reassurance that the reading and writing media they use are really alternate ways to reading and writing. This would result in a positive attitude to these media, particularly when they realise that these media are just as valuable as the print medium. Moreover, the provision of first-hand experiences in the use of the various reading and writing media would overcome any resistance to these media, as it could potentially be the media they would use for their reading and writing tasks.

Undoubtedly, as with the print medium, a positive attitude to and respect for the various reading and writing media used by persons who are blind would be inculcated only if these qualities are displayed by instructors. Equally important, instructors must have

the necessary training in the various reading and writing media if they are to impart any meaningful skills to their learners.

It must be emphasised that the use of the Integrated Reading and Writing Model presupposes the availability of various reading and writing media in schools and training centres, so that learners who are blind would have hands-on experience during lessons. Additionally, schools and training centres need not provide instruction in all models of a particular medium, for example, different models of portable electronic notetakers. Once they have received training in the use of a portable electronic notetaker, learners should be able to apply their knowledge and skills when using other notetakers.

Essentially, the use of the Integrated Reading and Writing Model would assist in resolving the dilemma concerning the medium that persons who are blind should be taught. Equally important, the findings from the survey indicate support for training in the use of the various media. Clearly, this can best be achieved through an Integrated Reading and Writing Model.

6.5.4.2 *Guidelines for an integrated reading and writing model*

Although an individualised integrated reading and writing model may be developed to meet the specific needs of schools and adult training centres, the following guidelines are provided on how the integrated model may be applied in practice. It must be emphasised that the idea of the Integrated Reading and Writing Model is the researcher's own recommendation, and not based on any existing model.

(a) Objectives of the model

Although not exhaustive, the following objectives could inform the development of an integrated reading and writing model for learners who are blind:

- to expose learners to available reading and writing media;
- to provide learners with training in the effective use of the various media;
- to provide learners with opportunities in class to use the various media; and
- to provide learners with authentic contexts in which to use the various media.

(b) Suggested outcomes of the model

Learners who receive training through the integrated reading and writing model should be able to:

- explain the functioning and use of the various reading and writing media;
- based on the need and/or circumstances, use a single medium, or a combination of media in authentic contexts.

(c) The approach of the model

The Integrated Reading and Writing Model proposes a developmental skills approach, underscoring the importance of progressing from basic to advanced skills in the various media. However, even while learners are acquiring basic skills in one medium, basic skills in the use of another medium could also be introduced. For example, while learning the basics of Braille, learners could acquire skills in the use of audiocassettes to listen to, for example, articles on the history of the development of Braille, short success stories on the use of other media, or even articles of general interest.

The Integrated Reading and Writing Model advocates the inculcation of independence and responsibility in learners. This suggests that learners who are blind will not only be able to use the various media independently, but will also share the responsibility for the care of the media.

Based on the principle of collaboration, the integrated model advocates a team-teaching approach, so that there is clear articulation, not only between class lessons, but also with regard to the specific outcomes of lessons. Furthermore, instructors who provide training

in the various media would be part of a Communication Skills Department at a school or adult training centre, rather than functioning in discrete units.

The advantage of team-teaching and collaboration is that learning programmes would be developed collaboratively, drawing on the collective knowledge, skills and experience of the team of instructors within the Communication Skills Department. In addition, learners would have the benefit of the collective knowledge and skills of a team of

instructors working in the same department. This presupposes that the various instructors would be proficient in the use of the various media, and not be restricted to knowledge and skills in a single medium. Consequently, the integrated reading and writing model advocates intensive training for instructors on the use of and training in the various media in preparation for the training of learners.

(d) Principles underpinning the integrated reading and writing model

The following principles, which are based mainly on sound teaching and learning practices, may serve as guidelines for the development of an integrated reading and writing model:

- acknowledging the individual differences of learners;
- providing training as early as possible in a learner's schooling career;
- promoting the active participation of learners in the integrated training model;
- emphasising the use of reading and writing media in authentic contexts;
- adopting a holistic approach to training, rather than compartmentalising training into discrete components, each functioning in isolation; and
- viewing training as a collaborative process, with the various instructors working together to provide training in the various media.

(e) Formative and summative assessment

The Integrated Reading and Writing Model recommends both formative and summative assessments to obtain measurable evidence of learners applied competencies.

With regard to formative assessment, learners would, for example, be required to submit projects that would require the use of the various media.

Summative assessment would provide evidence of learners' competencies as the basis for progress to the next level, for example, being able to accurately type a specified number of words per minute on a computer keyboard, or being able to read Braille at a specified number of words per minute.

6.5.4.3 Suggested outline of a learning programme based on the Integrated Reading and Writing Model

The following is an outline of a learning programme based on the Integrated Reading and Writing Model. It is based on the assumption that learners have acquired basic skills in the use of the identified media.

Title: Integrate the use of Braille, the audiotape and the computer.

Learning outcomes

After completing this learning programme, learners should be able to:

- using a Perkins Braille, accurately type the selected text from the audiotape into contracted Braille at a minimum of 35 words per minute;
- accurately type the information from the text in Braille into the computer at a minimum of 35 words per minute.

Outline of lesson plan

Introduction

- in preparation for the lesson, learners will be required to retrieve their audiocassette recorders and Perkins Braille from their respective cupboards;
- learners will be required to tactually explore their audiocassette recorders and Perkins Braille to ensure that they are ready for use;
- learners will be required to ensure that they have sufficient Braille paper for their writing tasks.

The body of the lesson may include the following components:

- orientating learners to the position of the various buttons and switches on the audiocassette recorder;
- introducing learners to techniques on how to identify side a and side b of a cassette;
- observing learners' ability to manipulate the respective buttons or switches to play, pause, forward, rewind or eject the cassette.
- observing learners' ability to insert paper accurately into the Perkins Braille in

preparation for brailleing.

Activity 1

- Learners to listen to the selected text on audiotape and to write it in Braille using their Perkins Braille writers.
- Instructors to check the brailled text for accuracy, and to calculate the average number of words per minute.

Activity 2

- Learners to read the text in Braille and to enter it into the computer.
- Instructors to check the text entered into the computer for accuracy, and calculate the average number of words per minute.

Assessment criteria:

Instructors would know that learners are competent to enter text from an audiotape into Braille when:

- using a Perkins Braille writer, learners accurately type the information from the audiotape into Braille at a minimum of 35 words per minute.

Instructors would know that learners are competent to enter the Brailled text into the computer when:

- learners accurately type the information from the text in Braille into the computer at a minimum of 35 words per minute.

Conclusion of lesson

- learners to file their brailled exercise sheets;
- learners to replace their audiocassette recorders and Perkins Braille writers in their assigned cupboards.

6.5.4.4 *General comments on the integrated reading and Writing Model*

It must be emphasised that learners who are blind should be encouraged to use the various media in different combinations, as their skills would have practical application in the context of education and employment. For example, in preparing for an assignment, learners could scan a chapter from a textbook into their computer. They could then read the scanned text using their text-to-speech software, and make notes using their Perkins Braille. Depending on the number of references required, the process of scanning, reading and brailleing could be repeated. In this way, the learner would have direct and independent access to information that would assist in writing the assignment.

Hopefully, the guidelines for an Integrated Reading and Writing Model provided in this chapter would enable instructors at schools and training centres to develop appropriate learning programmes. It must be emphasised that the researcher provided guidelines rather than a comprehensive model, as the latter would have warranted a separate study.

6.6 CONCLUDING REMARKS

In tracing the development of the education and employment of persons who are blind, what emerges forcefully is that significant strides have been made, both in terms of the active participation of persons who are blind, and society's attitudes towards them. While notable changes have been made as a direct result of the gradual transformation of society towards persons who are blind, it must be emphasised that the bulk of the changes have largely been the result of the collective efforts of persons who are blind.

With specific reference to developments pertaining to the various reading and writing media, the crucial role of persons who are blind cannot be ignored. The invention of Braille by Louis Braille provided the first and giant step towards providing a practical and viable reading and writing medium for persons who are blind. Additionally, developments in respect of speech access technology have been the direct result of the expressed

needs and valuable input of persons who are blind. The result is that speech access technology has become an integral part of many reading and writing media. Equally important is the fact that the range of reading and writing media in schools and adult training centres has increased, making it possible for learners who are blind to choose the medium that best suits their needs in a specific context. Unfortunately, there will always be those who will not be able to afford the cost of the various media, and who will therefore have to use the medium they have. Hopefully, an increase in the demand for technology will be accompanied by lower prices, making the various media more affordable.

However, gaining access to the various media will not ensure effective use. Therefore, if the various reading and writing media are to be of value to the majority of persons who are blind, training in the use of the media should be provided through an integrated approach. Only through an integrated reading and writing approach will they be assured of being exposed to the various media. Equally important, through an integrated reading and writing approach, persons who are blind would appreciate the relevance and practical benefits of the various media. Essentially, the integrated model will adequately prepare them for the challenges of reading and writing tasks in various contexts.

Finally, in the absence of documented research in the field of blindness in South Africa, academics are apt to rely on studies undertaken in other countries. Hopefully, this study will serve as a catalyst for related studies in the field of blindness in South Africa.

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ANNEXURE

QUESTIONNAIRE FOR BLIND PERSONS IN EMPLOYMENT

1. BIOGRAPHICAL INFORMATION

1.1 Age in years

20 years and younger = 1
Between 21-29 years = 2
Between 30-39 years = 3
Between 40-49 years = 4
Between 50-59 years = 5
60 years and older = 6

1.2 Sex

Male = 1
Female = 2

1.3 In which province do you live?

Gauteng = 1
Free State = 2
North-West Province = 3
Limpopo Province = 4
Western Cape = 5
Eastern Cape = 6
Northern Cape = 7
Mpumalanga Province = 8
KwaZulu-Natal = 9

1.4 When did you become blind?

At birth = 1
Between birth and starting school = 2
During my primary school years = 3
During my secondary school years = 4
While I was in employment = 5

1.5 Which type of school did you attend?

Special school = 1
Ordinary school = 2

1.6 In which province is the school?

Gauteng = 1
Free State = 2
North-West Province = 3
Limpopo Province = 4
Western Cape = 5
Eastern Cape = 6

Northern Cape = 7
Mpumalanga Province = 8
KwaZulu/Natal = 9

2. EMPLOYMENT HISTORY

2.1 Are you:

In full-time employment = 1
In part-time employment = 2

2.2 For how many years have you been employed in your current position?

3 years or less = 1
4-6 years = 2
7-9 years = 3
10-12 years = 4
13-15 years = 5
More than 15 years = 6

2.3 From the following list, choose the option that best describes the category of your current employment:

Self-employed = 1
Employed in a Non-Governmental Organisation (NGO) = 2
Employed in the Public Service = 3
Employed at a school = 4
Employed at a higher education institution = 5
Employed in the commercial sector = 6
Employed in the legal field = 7
Employed in industry = 8

2.4 In which province is the organisation in which you are currently employed?

Gauteng = 1
Free State = 2
North-West Province = 3
Limpopo Province = 4
Western Cape = 5
Eastern Cape = 6
Northern Cape = 7
Mpumalanga Province = 8
KwaZulu/Natal = 9

3. READING/WRITING TASKS

3.1 Did you request specific adaptive technology from your employer?

No = 0
Yes = 1

3.2 Which adaptive technology from the following list did you request?

- i. Perkins braille
No = 0
Yes = 1
- ii. Electronic Braille embosser
No = 0
Yes = 1
- iii. Computer with speech output
No = 0
Yes = 1
- iv. Portable electronic notetaker
No = 0
Yes = 1
- v. Optacon
No = 0
Yes = 1
- vi. OCR scanner
No = 0
Yes = 1
- vii. Audiocassette recorder
No = 0
Yes = 1
- viii. Refreshable Braille display
No = 0
Yes = 1

3.3 Which adaptive technology from the following list did you receive?

- i. Perkins braille
No = 0
Yes = 1
Not applicable = 2
- ii. Electronic Braille embosser
No = 0
Yes = 1
Not applicable = 2
- iii. Computer with speech output
No = 0
Yes = 1
Not applicable = 2
- iv. Portable electronic notetaker
No = 0

Yes = 1
Not applicable = 2

v. Optacon
No = 0
Yes = 1
Not applicable = 2

vi. OCR scanner
No = 0
Yes = 1
Not applicable = 2

vii. Audiocassette recorder
No = 0
Yes = 1
Not applicable = 2

viii. Refreshable Braille display
No = 0
Yes = 1
Not applicable = 2

3.4 Was the cost of the adaptive technology required to perform your work raised as an issue by your employer?

No = 0
Yes = 1
I did Not require adaptive technology = 2

4. BRAILLE AS A READING/WRITING MEDIUM

4.1 Are you able to read

Uncontracted braille = 1
Contracted braille = 2
Both contracted and uncontracted braille = 3
None of the above = 4

4.2 Do you prefer reading

Uncontracted braille = 1
Contracted braille = 2
Both contracted and uncontracted braille = 3
None of the above = 4

4.3 How often do you read material in braille

Never = 0

Sometimes = 1
Often = 2

4.4 How often do you receive material in braille

Never = 0
Sometimes = 1
Often = 2

4.5 From which of the following organisations do you receive material in braille

- i. The South African Library for the Blind
No = 0
Yes = 1
- ii. Braille Services
No = 0
Yes = 1
- iii. Pioneer Printers
No = 0
Yes = 1
- iv. South African National Council for the Blind
No = 0
Yes = 1

4.6 Are you able to write in

Uncontracted braille = 1
Contracted braille = 2
Both contracted and uncontracted braille = 3
None of the above = 4

4.7 Do you prefer to write in

Uncontracted braille = 1
Contracted braille = 2
Both contracted and uncontracted braille = 3
None of the above = 4

4.8 Are you able to use a slate and stylus to write Braille?

No = 0
Yes = 1

4.9 How often do you use a slate and stylus to write Braille?

Never = 0

Sometimes = 1
Often = 2

4.10 Did you receive training in the use of the slate and stylus?

No = 0
Yes = 1

4.11 Are you able to use a Perkins Braille to write Braille?

No = 0
Yes = 1

4.12 How often do you use a Perkins Braille to write Braille?

Never = 0
Sometimes = 1
Often = 2

4.13 Did you receive training in the use of the Perkins Braille?

No = 0
Yes = 1

4.14 Do you think that your use of Braille as a reading and writing medium has helped you to manage your reading and writing tasks at school?

No = 0
Yes = 1
Not applicable = 2

4.15 Do you think that your use of Braille as a reading and writing medium has helped you to manage your reading and writing tasks in higher education?

No = 0
Yes = 1
Not applicable = 2

4.16 Has your ability to use Braille as a reading and writing medium helped you to do your work more effectively in your current employment?

No = 0
Yes = 1
Not applicable = 2

5. AUDIOTAPES

5.1 Do you read material recorded on audiotape?

No = 0
Yes = 1

5.2 How often do you read material on audiotape?

Never = 0
Sometimes = 1
Often = 2

5.3 Do you use the audiotape to record documents at work?

No = 0
Yes = 1

5.4 Do you use the audiotape to record the proceedings of meetings at work?

No = 0
Yes = 1

5.5 From which of the following organisations do you receive material on audiotape?

i. Tape Aids for the Blind
No = 0
Yes = 1

ii. The South African Library for the Blind
No = 0
Yes = 1

iii. Pioneer Printers
No = 0
Yes = 1

v. South African National Council for the Blind
No = 0
Yes = 1

5.6 Do you think that your use of the audiotape as a reading/recording medium has helped you to manage your reading and writing tasks at school?

No = 0
Yes = 1
Not applicable = 2

5.7 Do you think that your use of the audiotape as a reading/recording medium has helped you to manage your reading and writing tasks in higher education?

No = 0
Yes = 1
Not applicable = 2

5.8 Has the audiotape as a reading/recording medium helped you to do your work more effectively in your current employment?

No = 0
Yes = 1
Not applicable = 2

6. TALKING BOOKS

6.1 Are you aware of digital talking book technology

No = 0
Yes = 1

6.2 Do you receive digital talking books?

No = 0
Yes = 1

6.3 In which format do you receive talking books?

On long-playing records = 1
On audiotape = 2
On compact disc = 3
Not applicable = 4

7. COMPUTERS WITH SPEECH OUTPUT

7.1 Are you able to use a computer with speech output?

No = 0
Yes = 1

7.2 How often do you use a computer with speech output?

Never = 0
Sometimes = 1
Often = 2

7.3 Did you receive training in the use of computers with speech output?

No = 0
Yes = 1

7.4 Which text-to-speech software do you use on your computer?

i. Window-Eyes
No = 0
Yes = 1

Not applicable

- ii. JAWS
No = 0
Yes = 1
Not applicable
- iii. Hal
No = 0
Yes = 1
Not applicable = 2
- iv. Windows Bridge
No = 0
Yes = 1
Not applicable = 2
- v. Dual
No = 0
Yes = 1
Not applicable = 2

7.5 Do you use a computer with speech output at work?

No = 0
Yes = 1

7.6 Do you think that the use of a computer with speech output as a reading and writing medium has helped you to manage your reading and writing tasks at school?

No = 0
Yes = 1
Not applicable = 2

7.7 Do you think that the use of a computer with speech output as a reading and writing medium has helped you to manage your reading and writing tasks in higher education?

No = 0
Yes = 1
Not applicable = 2

7.8 Has your ability to use a computer with speech output as a reading and writing medium helped you to do your work more effectively in your current employment?

No = 0

Yes = 1
Not applicable = 2

8. PORTABLE ELECTRONIC NOTETAKERS

8.1 Do you use a portable electronic notetaker?

No = 0
Yes = 1

8.2 How often do you use a portable electronic notetaker?

Never = 0
Sometimes = 1
Often = 2

8.3 Did you receive training in the use of portable electronic notetakers?

No = 0
Yes = 1

8.4 Do you use a portable electronic notetaker in your current employment?

No = 0
Yes = 1

8.5 Do you think that your use of a portable electronic notetaker as a reading and writing medium has helped you to manage your reading and writing tasks at school?

No = 0
Yes = 1
Not applicable = 2

8.6 Do you think that your use of a portable electronic notetaker as a reading and writing medium has helped you to manage your reading and writing tasks in higher education?

No = 0
Yes = 1
Not applicable = 2

8.7 Has your ability to use a portable electronic notetaker as a reading and writing medium helped you to do your work more effectively in your current employment?

No = 0
Yes = 1

Not applicable = 2

9. THE OPTACON

9.1 Do you use an Optacon?

No = 0
Yes = 1

9.2 How often do you use an Optacon?

Never = 0
Sometimes = 1
Often = 2

9.3 Did you receive training in the use of the Optacon?

No = 0
Yes = 1

9.4 Do you use an Optacon in your current employment?

No = 0
Yes = 1

9.5 Do you think that the Optacon is a useful reading medium for persons who are blind?

No = 0
Yes = 1
I do Not know = 2

9.6 Do you think that your use of the Optacon as a reading medium has helped you to manage your reading tasks at school?

No = 0
Yes = 1
Not applicable = 2

9.7 Do you think that your use of the Optacon as a reading medium has helped you to manage your reading tasks in higher education?

No = 0
Yes = 1
Not applicable = 2

9.8 Has your ability to use the Optacon as a reading medium helped you to do your work more effectively in your current employment?

No = 0
Yes = 1
Not applicable = 2

10. OPTICAL CHARACTER RECOGNITION DOCUMENT READER (OCR SCANNER)

10.1 Do you use an OCR scanner?

No = 0
Yes = 1

10.2 How often do you use an OCR scanner?

Never = 0
Sometimes = 1
Often = 2

10.3 Did you receive training in the use of an OCR scanner?

No = 0
Yes = 1

10.4 Do you use an OCR scanner in your current employment?

No = 0
Yes = 1

10.5 Do you think that your use of an OCR scanner as a reading medium has helped you to manage your reading tasks at school?

No = 0
Yes = 1
Not applicable = 2

10.6 Do you think that your use of an OCR scanner as a reading medium has helped you to manage your reading tasks in higher education?

No = 0
Yes = 1
Not applicable = 2

10.7 Has your ability to use an OCR scanner helped you to do your work more effectively in your current employment?

No = 0
Yes = 1
Not applicable = 2

11. REFRESHABLE BRAILLE DISPLAYS

11.1 Do you use a refreshable braille display?

No = 0
Yes = 1

11.2 How often do you use a refreshable braille display?

Never = 0
Sometimes = 1
Often = 2

11.3 Did you receive training in the use of a refreshable Braille display?

No = 0
Yes = 1

11.4 Do you use a refreshable Braille display in your current employment?

No = 0
Yes = 1

11.5 Do you think that your use of a refreshable Braille display has helped you to manage your reading and writing tasks at school?

No = 0
Yes = 1
Not applicable = 2

11.6 Do you think that your use of a refreshable Braille display has helped you to manage your reading and writing tasks in higher education?

No = 0
Yes = 1
Not applicable = 2

11.7 Has your ability to use a refreshable Braille display helped you to do your work more effectively in your current employment?

No = 0
Yes = 1
Not applicable = 2

12. LIVE READERS AND SCRIBES

12.1 Do you use a live reader to read personal documents?

No = 0
Yes = 1

12.2 How often do you use a live reader to read personal documents?

Never = 0
Sometimes = 1
Often = 2

12.3 Do you use a live reader to read documents at work?

No = 0
Yes = 1

12.4 How often do you use a live reader to read documents in your current employment?

Never = 0
Sometimes = 1
Often = 2

12.5 Do you use a scribe to write your personal documents?

No = 0
Yes = 1

12.6 How often do you use a scribe to write your personal documents?

Never = 0
Sometimes = 1
Often = 2

12.7 Do you think that your use of live readers and scribes has helped you to manage your reading and writing tasks at school?

No = 0
Yes = 1
Not applicable = 2

12.8 Do you think that your use of live readers and scribes has helped you to manage your reading and writing tasks in higher education?

No = 0
Yes = 1
Not applicable = 2

12.9 Has the use of live readers and scribes helped you to do your work more effectively in your current employment?

No = 0
Yes = 1
Not applicable = 2

13. GENERAL

13.1 If you had the choice of a medium to read documents and books, which medium from the following list would you choose?

Braille = 1
Audiotape = 2
Computer with speech output = 3

Portable electronic notetaker = 4
Optacon = 5
OCR scanner = 6
Live reader = 7

13.2 If you had the choice of a writing/recording device/assistance to write/record documents, which device from the following list would you choose?

Slate and stylus = 1
Perkins Braille = 2
Audiotape = 3
Computer with speech output = 4
Portable electronic notetaker = 5
Scribe = 6

13.3 In which device do you think learners at school should receive instruction:

- i. Slate and stylus
No = 0
Yes = 1
I do Not know = 2
- ii. Perkins Braille
No = 0
Yes = 1
I do Not know = 2
- iii. Audiotape
No = 0
Yes = 1
I do Not know = 2
- iv. Computer with speech output
No = 0
Yes = 1
I do Not know = 2
- v. Portable electronic notetakers
No = 0
Yes = 1
I do Not know = 2
- vi. Optacon
No = 0
Yes = 1
I do Not know = 2
- vii. OCR scanner
No = 0
Yes = 1
I do Not know = 2

- viii. Refreshable Braille display
 - No = 0
 - Yes = 1
 - I do Not know = 2

13.4 Do you think that there is a decline in the use of braille?

- No = 0
- Yes = 1
- I do Not know = 2

13.5 There is a decline in the use of Braille because:

- Fewer persons who are blind use Braille = 1
- Limited material is available in Braille = 2
- Greater use is made of computer technology = 3
- There is No decline in the use of Braille = 4

13.6 Do you think that computer technology will replace braille?

- No = 0
- Yes = 1
- I do Not know = 2

13.7 Computer technology will Not replace braille because:

- Braille is an affordable reading and writing medium = 1
- Braille provides direct access to information = 2
- Braille is easier to learn than other media = 3
- Technology will replace Braille = 4

13.8 Do you think that the audiotape as a reading/recording medium for persons who are blind will be replaced by computer technology?

- No = 0
- Yes = 1
- I do Not know = 2

13.9 The audiotape as a reading/recording medium may be replaced by computer technology because:

- Fewer persons who are blind use audiotapes = 1
- Greater use is made of computers with speech output = 2
- The audiotape will Not be replaced by computer technology = 3