

# Language Matters

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## CONTENTS

# Tailoring print materials to match literacy levels: A challenge for document designers and practitioners in adult literacy

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## Abstract

One in three South Africans aged 20 and older has not completed primary school, or has no schooling at all. Communication specialists who are in the business of writing public information documents need to take cognisance of this fact if they are committed to producing documents that meet the needs and skill levels of their different audiences. They also need a basic understanding of the reading strategies of both highly skilled and less-skilled readers, an awareness of the differences in processing and acceptance of visuals by skilled and unskilled viewers, and the ability to translate the relevant user variables into textual variables. This article is aimed at giving an overview of the most important theories that describe and/or explain how low-literate audiences process and react to printed information, and to match these theories with research-based principles and best practices for designing reader-centred public information documents. The outcome of the article is a comprehensive set of design heuristics for low-literacy public information materials, based on relevant information-processing features that have been derived from the literature on reading comprehension and visual literacy.

## Introduction

Adult literacy skills are essential for the economic success and social advancement of both individuals and societies (International Adult Literacy Survey 2004). Today's knowledge economy demands understanding and use of information from various types of texts in different media. A major challenge for communication specialists is to design materials that will facilitate this process. However, owing to time and budget constraints, these practitioners often rely on gut feelings and general style sheets for plain language writing, which may result

 

in the production of materials that do not fit the needs and the skills of the intended audiences.

The main objective of this contribution is to give an overview of the most important theories that describe how low-literate audiences process and react to printed information, and to match these theories with research-based principles and best practices for designing low-literacy materials. On the basis of the evidence from process and practice, a comprehensive set of design heuristics for low-literacy public information materials is compiled to assist document designers and practitioners in adult literacy.

## The literacy situation in South Africa

According to the 2001 census, 17,9 per cent of the South African population received no formal schooling, and 16 per cent received some primary schooling, but did not complete primary school (see Figure 1).

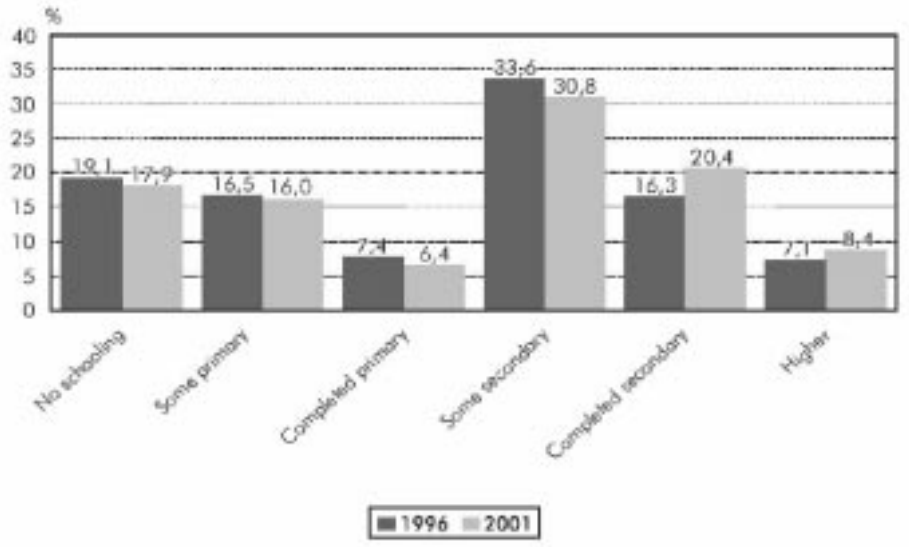


**FIGURE 1: Literacy levels in South Africa (Project Literacy, 2004)**

If a definition of *functional literacy* is taken as being able to read at the Fifth Grade level or higher (cf. Doak, Doak and Root 1996, 2), it means that about a third of the South African population is functionally illiterate (see also Harley 2003, 10). The implication is that a third or more of adult South Africans cannot read newspapers, health instructions, agricultural extension materials or directions on a box of cake mix, among other things. We can also deduce from Figure 1 that two other groups, comprising those who have completed

primary school and those who have received some secondary schooling (41%), have marginal reading skills. (*Marginal* would not be an inappropriate description in the light of the finding that adults typically read three to five grade levels lower than the years of schooling completed – cf. Doak et al. 1996, 6.) Much of the public information materials have readability levels that are over the heads of both groups. Carstens and Snyman (2003) have, for instance, established that the basic information materials on HIV/AIDS published and distributed by the National Department of Health have a readability level of just below 60 (equivalent to Grade 9).

These figures may lead one to conclude that print (including formats such as pamphlets, package inserts, posters and flip charts, newsletters, fact sheets, booklets, and training manuals) is not an appropriate medium to use for instructional materials in South Africa. The print media have also derived a 'bad name' from their links to theories and models that involve mainly a one-way flow of knowledge from the information producers (research scientists) to the clients or recipients.

However, the literature on communicating with low-literate people (particularly in the fields of health promotion and agricultural extension), has pointed out several advantages of print materials (Zimmerman and Perkin 1982; PATH 2002, 5; Morris and Stilwell 2003, 72), which can be subsumed under three headings:

- *Production and delivery:* inexpensive production and distribution, easy storage, repeated use, transfer to others, tailored to specific geographical, and linguistic and cultural needs.
- *Information transfer:* awareness creation, instruction, persuasion (behaviour change), reinforcement, and accurate and uniform transmission of factual and technical information.
- *Literacy promotion:* enhancement of visual and verbal reading skills.

## Theories and models of how low-literate people process information

The following two sections give an overview of the various stages of verbal and visual processing, emphasising the differences between skilled and unskilled readers and viewers:

### Processing verbal information

According to McKeon (2003), there are many models that attempt to explain the complex process of reading. In order to understand the multitude of difficulties that might face a low-literate person, she identifies five steps in the reading process: *stimulus* (perception), *decoding*, *encoding*, *output* and *feedback*. Each

step occurs automatically for the fluent reader, yet the low-literate might encounter stumbling blocks in one or more of the steps.

The main differences between the processing skills and strategies of experienced and inexperienced readers are summarised below under the headings McKeon proposes. However, the fourth step, *output*, has been omitted as it is assumed that 'oral or silent reading' refers to the entire process, and not to a single step only. Another category, *Recall* (or *memory*) will be discussed as the last step, since remembering information is a crucial element of reading, especially if it entails learning and applying information in new situations.

*1. Stimulus (perception)*

According to McKeon (2003), the stimulus or input phase involves acuity (the ability actually to see the page) as well as the ability to discriminate between letters, words, numbers, pictures, or whatever is on the page. To the processes that characterise this phase Field (2003, 18) adds two more, namely, matching the whole to a representation stored in long-term memory, and allocating an identity or category to the sensation.

Perception involves periods of fixation, when the eye rests upon a point in the text, and saccades (a series of rapid eye movements along the line of printing or viewing). At the end of a printed line, the reader makes a return sweep to the following line (Field 2003, 73). Low-literate readers will make more and longer fixations than skilled readers when decoding written text. Less skilled reading also has a much higher level of regressive eye movements (reverting to one or more former fixations). According to Field (2003, 75), regression in the average reader only adds about ten per cent to the fixations; in an unskilled reader, it accounts for much more. Poor readers will also take longer in the matching and categorisation stages (Pretorius 2002, 30).

*2. Decoding*

Decoding is the word recognition stage, and many low-literates lack strategies for recognising words (McKeon 2003). Often they have sight words which they have memorised to 'get by', but they are not skilled in other ways to identify words that they have never seen. In health-related materials, for example, low-literate readers may know key words such as *exit* and *X-ray*, from sight or memory. They often attempt to sound out the words they do not know, but since the orthography may differ widely from the phonetics in certain languages, this strategy may not work.

Wagner and Torgesen (1987, quoted in De Jong and Van der Leij 1998, 50), found phonological abilities to be a major determinant of the development of

word decoding. Lack of vocabulary knowledge is therefore not the most important explanation for decoding problems, although it does play an important role in reading comprehension.

It is to be expected that poor decoding skills will influence reading speed. Low-literate readers decode one word at a time (Doak et al. 1996, 4–5). If word recognition occurs slowly and with difficulty, it causes a bottleneck in the reading process. The reader then does not have many resources left for higher-level processing. This results in poor comprehension, since a word-by-word reading strategy causes readers to forget what they have read in the first part of a sentence before getting to the end of it. Because their energy is being used up in word-by-word processing, they do not look for informational coherence and consistency in a text, and often fail to detect and repair semantic inconsistencies (cf. Doak et al. 1996, 4; also Garner 1980 and Paris and Myers, 1981, in Pretorius 2002, 41).

To compensate for a lack of decoding skills, low-literates often depend on the context of the situation to provide cues, for example a patient may look at the word *apple* on a nutritional brochure and guess the word because of an accompanying picture.

*3. Encoding*

Encoding entails comprehending the information. One of the most important differences between skilled and less skilled readers is the ability to identify main ideas and to recognise the gist of a text. The researchers Yuill and Oakhill (1991, in Pretorius 2002, 35), found that good comprehenders identified the main point in a text 79 per cent of the time, whereas the poor comprehenders were only successful 46 per cent of the time. These findings were corroborated by Carstens and Snyman (2003) in their pilot research on how well the Department of Health*'s* leaflet on *HIV/AIDS counselling* (Khomanani Campaign) was understood by low-literate clinic patients. Among the 27 respondents only 15 (i.e. 55,5%) could give an approximation of the main point of the particular leaflet, namely 'guidance for people who [intend to] go for an HIV test'. Ten of the other 17 simply answered that the leaflet was 'about AIDS', one identified condom use as the main point, and one answered 'abstinence from sex' (Carstens and Snyman 2003, 126). One of the reasons why low-literates may fail to grasp the main message is because of the discrepancy between their prior knowledge and experience, and the prior knowledge presupposed by the author (McKeon 2003).

Other differences are that less skilled readers have difficulty making inferences from the context, perceiving relationships between parts of the texts (Doak et al. 1996, 4), and applying relevant information to new situations (i.e., using analogy

as an inference strategy). They may, for instance, not realise that an anecdote in a health brochure has personal relevance.

Low-literate readers often also have difficulty with basic cognitive skills, such as the ability to categorise concepts hierarchically. Doak et al. (1996, 3–4) cite the example of a poor reader who reads in a health brochure that a person on dialysis is not supposed to eat shellfish and poultry, without realising that the fried chicken that he eats regularly falls under the superordinate category 'poultry'. For foreign language readers of English the problem of relating hyponyms to superordinates may be compounded by lexical or referential gaps in the primary language (e.g. Field 2003, 14).

The National Cancer Institute (NCI) (1994) emphasises the tendency among low-literate readers to think in immediate rather than futuristic terms, and literal/concrete interpretation of information. They cite McKeever et al.'s (1956) example of a situation where a leaflet on treating diarrhoea in babies stated that the mother must 'push fluids'. The mother literally pushed fluids by tipping the baby's bottle upside-down and forcing the fluid down the baby even when the baby's responses had begun to slow down. The baby subsequently suffocated.

According to Yuill and Oakhill (2003, 196), less-skilled readers often have difficulty with the successful resolution of referents in a text, leading to ineffective comprehension. This may be attributable to the fact that unskilled readers fail to build an integrated representation of text as they read, and may be unable to retrieve the referent from the preceding text. Therefore they may fail to link anaphora (e.g. pronouns) to their antecedents (e.g. proper names, common nouns, noun phrases or larger discourse structures).

According to Coleman, Coon, Mohrmann, Hardin, Stewart, Gibson, Cantrell, Lord and Heard (2003, 67), research shows that, even with easy-to-read material, people with low literacy skills learn less, partly because they do not expect to learn much from printed materials. If materials do not address information they believe to be beneficial or relevant, they will not be motivated to read it.

### *4. Feedback*

Feedback entails thinking about information and knowing when one understands and when one does not understand. McKeon (2003) regards this stage as crucial. For the low-literate reader knowledge of one's own understanding may not be evident. This is one reason why low-literates' self-reports on reading comprehension are not reliable.

Low-literate readers have been found to struggle when asked to pinpoint where exactly they have difficulties understanding a text. They also have difficulty in

backtracking, checking on difficult sections, using fix-up strategies, and recognising inconsistencies in a text (Pretorius 2002, 41).

*5. Recall (memory)*

It is a well-researched fact that weak readers do not have good recall of what they have read, and may often recall inconsequential details rather than main points. One of the reasons provided by reading research scholars (Pretorius 2002, 37) is that weak readers' ability to remember information is linked to their ability to perceive text structure. Weak readers typically have problems recognising the organisation of a text. Poor recall of a text may also be an indication of poor comprehension, since it is easier to remember things that one understands.

## Processing visual information

The superiority of pictures to verbal text in terms of attracting attention, increasing the speed of message transfer, stimulating motivation and enhancing recall, have been emphasised by educationists and visual literacy experts alike (e.g. Paivio 1986; Sinatra 1986; Mayer and Gallini 1990; Wileman 1993; Mayer and Sims 1994; Mayer 1999), as well as by experts on low-literacy materials (Doak et al. 1996, 91, 94).

However, opinions are widely divergent on exactly how unskilled viewers differ from skilled viewers in their interpretation of pictures. These differences stem from different perspectives that are adopted in the various fields. For example, scholars working in the field of visual studies and information design argue that there is little difference between the processing of visuals by experienced and inexperienced 'readers'. This view is often referred to as the 'universality hypothesis'. On the other hand, researchers in development contexts have pointed out significant differences between processing by skilled and unskilled viewers.

According to Messaris (1994, 10), in the literature on this issue there are three broad categories of pictorial conventions that might pose interpretational obstacles to a first-time or inexperienced viewer, namely the

- unrealistic reproduction of colours and degrees of illumination of the real world (e.g. by unshaded outline drawings, black-and-white photographs)
- failure to represent the third dimension on a flat, two-dimensional surface
- omission of details in the shapes of persons and other objects (e.g. sketches or stick figures).

However, the growing body of systematic research on the interpretational abilities of pictorially inexperienced viewers has revealed that only one of the

three categories listed above causes any appreciable degree of trouble to inexperienced viewers (Messaris 1994, 10), namely the rendition of three dimensions by two-dimensional means. In other words, previous experience is not a prerequisite for the interpretation of outline drawings, black-and-white photographs, sketches, or stick figures – to name only four kinds of pictures.

Messaris (1994, 11–13) then explains the general process of how the brain 'translates' the retinal image into a mental representation of identifiable objects in three-dimensional space:

1. *Visual information is transmitted from the retina to the brain* via a two-dimensional array of light and colour values, to detect the outlines of objects and the edges of surfaces. This results in a mental representation that can be thought of as corresponding to an outline drawing.
2. *Assigning depth to the various parts of the outline* by calculating distances between the viewer and each part of the scene.
3. *Identification of the object by means of the outlines*, and matching them against a 'dictionary of object structures' in the brain's memory (Messaris 1994, 13).

For Messaris (1994, 13) these principles suggest that the ability to perceive and comprehend such incomplete images as sketches and stick figures may be an extension of an everyday, real-life perceptual skill rather than something one has to learn with specific reference to pictorial conventions. Therefore, sketches and other incomplete images should not greatly curtail the ability of inexperienced viewers to identify objects in pictures, and many pictorial conventions that might at first glance seem unrealistic, appear to be interpretable on the basis of any viewer's real-world visual skills. Messaris argues that even in the case of depth perception it would be hard to argue that the informational cues typically used by more experienced viewers constitute an arbitrary, exclusively pictorial set of conventions.

Practitioners and researchers working within the field of development communication paint a different picture of the relationship between visual literacy and picture processing. Unfortunately the literature on pictorial processing by low-literates is somewhat dated, as demonstrated by the resource lists of recent publications on pictorial communication in developing countries, such as Hoffmann (2000). This evidence seems to point to a general lack of recently undertaken research on pictorial processing and visual literacy in development contexts. Moreover, 'almost all studies lack a purposeful theoretical orientation' (Hoffmann 2000, 136).

The differences in visual processing by skilled and unskilled viewers that are

mentioned in the available literature will be outlined and exemplified below in terms of *attention/perception*, *decoding*, and *comprehension* factors.

*1. Attention/perception*

According to Doak et al. (1996, 93), skilled readers systematically scan a visual to find the central meaning/concept, quickly identify principal features, are able to separate key points from details, and quickly interpret the selected information to arrive at a meaning. In contrast, low-literates' eyes wander about the page without finding the central focus, skip over principal features, and often focus on a particular detail. As a result they are slow to interpret perceptual information. This claim resonates with the positive correlation other researchers have found between the number of eye fixations and visual literacy (Pettersson 1989, 68).

Ausburn and Ausburn (1983, 113), who investigated the difference between the pictorial analysis skills of students in developing countries (Papua New Guinea) and students in developed countries, found that Papua New Guinea students were not as skilled in visualisation, spatial scanning speed, detail/background separation, visual detail analysis and comparison, and ignoring of visual distraction as age peers in technologically developed countries. In another study (on which they report in the same article) they found that students with no schooling had more difficulty in finding a 'starting place' in analysing complex figures than those who had some schooling.

*2. Decoding (object identification)*

An aspect of visual literacy that is generally ignored by visual studies experts is the importance of a vocabulary of symbols (or visual conventions) in order to interpret many drawings used in mass media printed documents. The visually literate understand the difference between a cartoon speech balloon and a thought balloon; and for them sequential frames indicate the passing of time or people acting and reacting to each other. Additionally, there is an artistic tradition in Western illustration which uses highlights to show reflections on shiny surfaces. Thus an eye will be drawn with a small white mark in it which is understood by those for whom the convention is familiar. The reaction to such a mark in much of the illiterate world is that the eye is damaged (e.g. blind and covered with a grey cataract) (Bradley 1995, 74; Hoffmann 2000, 141; PATH 2002, 2). Visually inexperienced 'lookers' will easily interpret a dotted line from a woman's eyes to an apple on a table as 'a woman seeing an apple', while the low-literate individual might see a stick coming from the apple that pokes a woman in the eye (PATH 2002, 2).

According to PATH (2002, 2), symbols often have different meanings in different cultures. In the 1976 study in Nepal (Linney 1995, 24), findings

showed that the respondents had difficulty understanding symbols such as crosses, ticks and arrows.

*3. Comprehension*

PATH (2002, 2) emphasises that low-skilled viewers have problems with comprehending the pictorial conventions that indicate depth perspective. The research by Holmes in Kenya (1963, in Linney 1995, 23) and Hudson in South Africa (1966, referred to by Bradley 1995) support this claim. Hudson's respondents were, for instance, unable to interpret the size of an object as an indication of its distance from the artist/reference point. Bradley's (1995, 74) conclusion on the basis of evidence such as this is that there are both graphic and environmental conventions that need to be learnt before 'realistic' pictures can be understood without someone to explain them. A possible reason why some inexperienced viewers seem to have more difficulty in interpreting depth perspective than others is familiarity with content through cultural, environmental and societal experience (Zimmer and Zimmer 1978, 37). Segall, Campbell and Herskovits (1963) found that people who lived on plains where there was a large horizon and great distances could be viewed, understood perspective conventions because they were used to seeing figures getting smaller as they went away. Conversely, people who lived in forests or in high-rise cities were limited in their visual understanding of graphic conventions that are used to represent distance.

Picture 'syntax' is another stumbling block for low-literates. Linney (1995, 24) points out that visually unskilled persons have difficulty understanding sequences of pictures. They do not necessarily look at a series of pictures from left to right, or assume that there is any connection between the pictures in a series (also compare Hoffmann 2000, 142).

Art style has also been mentioned as a factor that may influence visual comprehension (PATH 2002, 2). A comprehensive study conducted in Nepal in the mid 1970s showed that from the six styles that were used detailed, shaded line drawings were understood best (72%), followed by photographs with background blocked out (67%), simple, unshaded line drawings (62%), silhouettes (61%), photographs without the background blocked out (59%), and lastly stylised drawings (49%). The research done by Cook in Papua New Guinea during the 1980s (Linney 1995, 26) corroborated these findings and also showed that the detailed, shaded line drawing was the most understandable art-style. Fuglesang (1970), however, found that photographs in which the background had been blocked out, leaving only the main pictorial elements, were the easiest to understand.

Bradley (1995, 11) emphasises the role of culture in visual comprehension:

'Although some pictures and diagrams are universally understood, there are many that are only understood within their own culture and others that seek to impose a cultural form on others . . . The assumption of universality should be examined carefully however, particularly when diagrams are being used.'

She claims (1995, 11) that pie charts are not universally understood, especially in countries where pies are not part of the cuisine. Although similar circular forms can be found in the cooking of most countries, for example chapattis in India, they are not sliced into portions for distribution but torn by an individual to accompany less solid food.

Exactly which aspects of picture processing are influenced by cultural acceptability, cultural convention and cultural taboo have not yet been researched conclusively. For instance, it is unclear whether the emotional reaction of a reader who has been offended by pictures (e.g. a picture indicating meat as a dietary component, when meat-eating is not part of the viewer's culture) will lead to a loss of attention, a loss of motivation or inadequate comprehension (McKeon 2003).

Understanding new information by linking it to culturally based conceptual models has been demonstrated by the research of Cornwall (1992) in Zimbabwe. Cornwall researched the ineffectiveness of standard pictures and diagrams of reproductive anatomy as shown in family planning clinics all over the world. The ineffectiveness seemed to stem from the fact that these visuals instantiated the Western medical model of reproductive anatomy and the way that the female reproductive system works. More success was achieved when illustrations were used that reflected ordinary people's knowledge of the body, and that were derived from body maps or diagrams drawn by local women on paper or on the ground. These drawings reflected knowledge from a more practical experience of the physical workings of the body, the dissection of animals, experience of pregnancies, and advice from peers and older women.

## Evaluating the appropriateness of materials

Materials assessment studies document that many education materials are not easily accessible to the average adult. The literature shows evidence of continued efforts to assess such materials and to ensure that the level of literacy required for comprehension is appropriate (Doak and Doak 1987; Meade and Byrd 1989; Daiker 1992). Rudd, Moeykens and Colton (1999) mention numerous examples of health materials that had been tested, and which scored between Grades 9 and 12 reading levels, that is, at least four levels above the literacy levels of low-literate readers.

The most commonly used tool for measuring the readability of *verbal materials* is the readability index. The main function of readability indices is to give a

quick assessment of writing density. More than 30 different formulas for calculating readability have been developed since the 1940s (Morris and Stilwell 2003, 76), of which the most popular ones are the Fog Index, the Flesch Reading Ease Score, the Flesch-Kincaid Grade Level Score, the Smog Index, the Dale-Chall Readability Index and the Spache Readability Index. Some are simple hand-calculated indices (SMOG and Fry), whereas others are calculated by dedicated readability software (RightWriter, Sensible Grammar, Liptak) or wordprocessor software packages (Flesch Reading Ease and Flesch-Kincaid formulas in MsWord and WordPerfect). However, the use of readability indices has been widely criticised. Meade and Smith (1991, in Morris & Stilwell 2003, 77) warn that the power and precision of readability indices may 'give a false sense of the validity of the process of assigning grade level equivalencies to text . . . [and] cause one to overlook the other important factors associated with being able to read'. These authors also point out that the usefulness of readability measures for predicting the reading ability of neo-literates is still largely unknown, especially those reading in a second or third language.

In an attempt to confront the inadequacies of readability formulas (i.e. the narrow focus on the complexity of words and sentences) Doak et al. (1996) developed a suitability assessment of materials instrument (SAM), which takes content, literacy demand, graphics, layout, typography, learning stimulation (motivation) and cultural appropriateness into consideration. SAM also has the advantage that it produces both quantitative and qualitative data: a suitability score can be calculated, and rich explanatory data is generated from the comments. Although the authors (Doak et al. 1996, 49) concede that 'there is a continuing need for more comprehensive evaluation instruments' they still regard SAM as 'a logical step toward meeting that need'. In the end human judgement and common sense, rather than mechanised analysis, are important when writing and assessing information materials (Meade and Smith 1991).

Measuring the suitability of *visual materials* is even more difficult, and not many measures of picture suitability have been attempted. As far as can be ascertained, none have been specially designed to measure suitability for visually unskilled viewers. Pettersson (1989) discusses six types of pretests for measuring picture quality in general, namely *observation* (attention) *ratings*, *utility/originality matrixes*, *ratings of communicative impact* (existing vs. new information); *interest scales* (interesting vs. boring), *legibility/readability matrixes*, and *picture readability indices*. Only the last two may be relevant in measuring the appropriateness of visuals for unskilled viewers. The so-called picture readability index will be discussed briefly.

The picture readability index was devised by Pettersson (1984, referred to in Pettersson 1989) on the basis of his understanding of the way a picture is executed with respect to different variables in the visual language. The actual purpose is to determine to what extent the rating of a picture by experts

(designers), coincides with the reception by actual viewers. He named this instrument the BLIX index. A picture's readability can be assessed by calculating its BLIX value. The greater the readability of a picture, the greater its functional, communicative impact.

Unlike the readability indices devised for verbal text, the BLIX index does not merely deal with issues of formal complexity, but caters for a whole range of variables at three important levels, namely, legibility, reading value and aesthetic value. BLIX values initially ranged from 0 (a virtually incomprehensible picture) to 5 (a very comprehensible picture). The BLIX value of a picture was initially calculated on the basis of the rating of up to 19 variables that researchers had found to be important for instructional message design. Experiments with ranking and rating of test pictures show that pictures with high BLIX values were ranked and rated better than those with lower values by children as well as by adults.

Pettersson (1989, 164) later revised the BLIX index and offered the following simple (digital) rating scheme:

| **Questions** | **Yes/No** |
|---|---|
| 1. (a) Colour picture: the picture is executed in a true-to-life colour. | |
| (b) Black-and-white picture: the contrast and grey scale in the picture are clear. | |
| 2. The picture has a shape other than a square or a rectangle or covers an entire page. | |
| 3. The picture has a legend which is brief, easy to understand and deals with the picture. | |
| 4. The picture is unambiguous and not too 'artistic'. | |
| 5. The picture has a dominant centre of interest at or near its optical centre (middle of the picture) and few details which can be regarded as distracting. | |

Although the 'questions' seem to address issues that are important for visually unskilled readers, they need to be operationalised in more concrete, and picture-specific terms. Even in relation to standard viewing contexts Pettersson (1989, 165) acknowledges that BLIX only represents the average difficulty or ease with which a picture can be read (as judged by a visual expert – AC).

## Assessing the literacy level of the reader

When designing materials for low-literate adults it is important to know how well they can read and comprehend. As discussed previously, the successful

interpretation of printed verbal texts depends on several subprocesses, including perception, decoding, comprehension, memory and reflection. In health education, two types of tests are generally used: those testing reading *(decoding)* skills, and those testing *comprehension*.

## Reading tests

Rudd et al. (1999) discuss the following tools commonly used to assess patients' ability to decode texts on health-related matters:

1. *The Rapid Estimate of Adult Literacy in Medicine (REALM)* (Davis, Crouch, Long, Jackson, Bates, George and Bairnsfather 1991; Davis, Mayeaux, Fredrickson, Bocchini, Jackson and Murphy 1994): For this test participants read from a list of 125 common medical terms, arranged in four columns according to the number of syllables they contain. REALM performed well in identifying patients with low reading ability, and a shortened version was subsequently developed and assessed. The shortened version takes two minutes and performed as well as the longer version in assessment of concurrent validity.
2. *Wide Range Achievement Test – Revised (WRATR)* (Davis et al. 1994): The WRATR is commonly used in educational settings, and requires a participant to read aloud lists of words that become increasingly difficult. When ten words have been consecutively mispronounced, the test is stopped, and a raw score, between 1 and 89, is computed and converted into a grade equivalent.

Although Doak et al. (1996) prefer the REALM test – one reason being that it takes less time to administer – it can only be applied in health contexts. Moreover, REALM offers less precision since scores are given as a range of grade levels rather than a specific grade level as in WRATR.

A general disadvantage of reading tests such as WRATR and REALM is that they do not require that patients understand the words – only that they are able to pronounce them. Davis, Michielutte, Askov, Williams and Weiss (1998) caution that these tests cannot determine the type of reading difficulty or its cause, and thus cannot be expected to diagnose specific problems. They may, however, prove useful in identifying patients for whom standard approaches and materials may not be effective.

## Comprehension tests

The method that is commonly applied to determine whether a reader has *understood* a text is the cloze test. Two other methods include the subject being required to transform what was read into his/her own words, and a listening test.

In health settings the cloze test is normally used for patients who have a WRATR/REALM score at the sixth grade or higher (compare Doak et al. 1996, 35). The standard cloze test comprises a relevant text of which every fifth word is deleted until about 50 words have been deleted, which then have to be filled in by the respondent. If a significant number of the respondents score below 40 per cent on the cloze test, the material used in the test is not appropriate for them. Either the text has to be adapted or a different method has to be used. The Test of Functional Health Literacy in Adults – TOHFLA (Parker, Baker, Williams and Nurss 1995) is a specific version of the cloze test developed for testing hospital materials (medical aid application forms, instructions for preparing for an upper gastrointestinal series, a standard hospital consent form, and labelled prescription vials). This test was developed in English and in Spanish, and includes a 17-item list of numerical ability and a 50-item test of reading comprehension applying the cloze procedure.

A huge problem facing document designers in developing countries where the local languages (languages other than the [colonial] lingua franca) are used in instructional materials for low-literate audiences is that no tests are available in these languages. The materials developer has to rely on literacy statistics and respondents' self reports. The problems with these methods of determining reading level are that nearly all non-readers or poor readers will seek to conceal the fact due to the strong social stigma attached to illiteracy. If asked to read a passage from a text they will often use excuses such as 'I forgot my glasses' or 'My eyes are tired' (cf. Doak et al. 1996, 6). Moreover, as mentioned above, years of schooling is not a good measure of literacy level.

As far as could be ascertained, no tests for measuring the readability of visuals by actual viewers (skilled or unskilled) have been compiled.

## Shortcomings of low-literacy materials

One of the most important challenges for materials developers and educators in adult literacy is to tailor printed materials to match the needs of their audiences. They have to provide materials that are easily understood, that help the reader to learn and that are motivating (which includes being culturally suitable). However, according to Doak et al. (1996, 73) most current materials have shortcomings. Frequently occurring problems with verbal materials are the following:

- *Too much information is included:* An information overload will discourage poor readers, affect the attention they pay to the document, bury the main message and obscure the priority of information. The problem will be compounded by the absence of a strong external structure (e.g. when the

layout, use of typography and chunking of the text do not provide cues for the reader).

- *Readability levels are too high for the average person:* Long words will significantly decrease decoding effectiveness and long sentences will influence decoding/comprehension by increasing cognitive load. Complex sentences will specifically hinder the reader in resolving referents through the successful interpretation of anaphora.
- *Difficult/uncommon words are seldom explained:* Unless difficult or uncommon words are explained through paraphrase or examples problems will arise in the decoding phase.
- *The reader is not encouraged to interact with the material:* If the text is read passively, without the reader experiencing personal involvement, learning and recall will be adversely affected.

The main problems that emerge from the literature on visual materials for low-literates are the following:

- *Readers cannot identify with the visual*: Socio-cultural and demographic variables (including ethnic group, gender, dress, social customs, acquaintance with symbols, and architectural and landscape settings) may cause the reader not to pay attention to the message at all. These factors may also influence the acceptability of the message and decrease motivation to read. (cf. Tomaselli and Tomaselli 1984; Doak et al. 1996, 99). Comprehension may also be hindered if the visual fails to evoke a schema against which to interpret the new information.
- *The artistic style hinders identification:* Art style does not merely affect likeability, but may also influence comprehensibility. Highly stylised images may not be recognised, and processing may already be halted in the perceptual phase.
- *The depiction of depth perception is unclear:* If readers experience problems with linear perspective (e.g. the lines of a road converging towards the horizon), depth perception on the basis of the relative size of objects (e.g. similar objects decreasing in size as they recede towards the horizon), and occlusion (superposition and overlapping of objects), the message may be misunderstood. Misunderstanding may arise from the fact that objects are not recognised, relationships between objects not comprehended, or the fact that the picture does not reflect real-life experience (which may have an impact on believability).
- *Too much detail is included:* Too much detail, for example too many figures or objects, or a busy background (Doak et al. 1996, 103) may cause the eyes of the visually unskilled reader to wander about the page without finding the central focus of the visual, or focusing on the wrong detail (p. 93).

- *Visuals and related text are separated:* If visuals are placed after the text which they explain, or if they are not printed on the same page as the related text and no explanatory captions are provided (Doak et al. 1996, 104), the viewer may fail to benefit from the supporting relationship. A low-literate reader may even completely fail to grasp the message.

## Proposed design heuristics

Many manuals and handbooks provide guidelines for designing low-literacy printed materials. They mostly highlight the importance of layout, typeface, style and size; white space; primacy of key information; using short words and explaining difficult words; using short sentences, using active instead of passive voice; and including interaction and reviews or summaries (compare Doak et al. 1996, 78).

However, in general, the literature provides limited (or no) evidence of whether the strategies used to meet the needs of low-literates are research-based. Moreover, it is often unclear whether the strategies are based on reader research, or whether they are based on text-focused evaluation by editors, subject-field experts, intermediaries or document designers.

A study that made an impressive attempt at eliciting research-based guidelines from the available literature, is one by Morris and Stillwell (2003). In Table 1 – which draws heavily on this study but also integrates guidelines from other sources – a set of heuristics for designing the textual elements (content, structure, style) as well as the graphic elements (visuals, typography, colour and layout) for low-literacy public information documents is suggested. The guidelines are linked to their purported effects on how low-literates' process verbal and visual materials, as outlined in the discussion above:

**TABLE 1: Design heuristics for print materials aimed at low-literate audiences**

| Design heuristics | Reader effects |
|---|---|
| **TEXTUAL ELEMENTS**<br>**Genre and medium** | |
| Tailor the number of messages to the medium and the genre (e.g. it is recommended that a pamphlet/leaflet is limited to one major theme) (PATH 2002, 34; Bembridge 1991) | Enhances comprehension and recall |
| **Content** | |
| Ground the content on an understanding of the information needs of the intended audience as expressed by themselves, link the content to the prior knowledge of the audience (Ballantyne 2002; Morris and Stilwell, 2003, 74) | Stimulates motivation, comprehension and recall |

| Design heuristics | Reader effects |
|---|---|
| **Content** | |
| Make the message applicable to real life situations (Betterley 2000, 2; PATH, 2002, 37) | Stimulates motivation (personal relatedness) |
| Reduce the amount of information to the essential facts that readers need to solve their problems or take decisions (Glanz and Rudd 1990, 114; Morris & Stilwell, 2003, 74); but keep in mind that the volume of content is affected by the thematic complexity of the subject. | Reduces cognitive load, enhances comprehension |
| Ask the audience to take action; in other words, do not simply raise awareness of problems without offering a solution (PATH 2002, 39) | Facilitates feedback (metacognitive reflection), enhances comprehension and increases motivation |
| Provide information about service delivery, – for example telephone numbers, Website addresses, physical addresses of services that are operational and accessible (PATH 2002, 40) | Enhances motivation to act |
| Provide information about the source(s) of information and the author as well as his/her affiliation. | Increases persuasiveness through source credibility |
| Information should be factually correct, evidence-based and current (Smith 1998). | Supports ethical and educational considerations |
| Use a credible source (give a voice to peers, doctors, counsellors, community opinion leaders) (PATH 2002, 37). | Enhances motivation to read and to comply with recommendations |
| Make readers *feel* something after reading the message, such as happiness, confidence, gladness or enthusiasm (PATH 2002, 37). | Stimulates recall through emotional involvement |
| If needed, tailor materials for different geographic regions of a country, and make it appropriate to the age, gender, educational level, ethnicity, socioeconomic status and lifestyle of the target audience (Morris and Stilwell 2003, 75; PATH 2002, 40). | Increases motivation to comply as well as comprehensibility by evoking cultural schemata |
| Decide on an emotional approach, e.g. a fear appeal, moral approach, rational (positive) approach (PATH 2002, 35–36) | Stimulates motivation and keeps attention |
| **Internal structure** | |
| Arrange content in a way that is logical for the audience (Velasco et al. 1996); e.g. by recommending actions or steps, by main and sub-themes, or by time (agricultural extension materials) (NCI 1994). | Facilitates comprehension |
| Start with the most important information, include review sections whenever possible, and restate the key points again at the end (Bembridge 1991; PATH, 2002, 37; Velasco et al. 1996) | Calls attention to important information that will enhance comprehension and recall |

| **External structure** | |
|---|---|
| Break content up into 'digestible' paragraphs or bulleted points (Betterly et al. 2000). | Chunking decreases cognitive load, and enhances comprehension and recall |
| Use headings and subheadings to emphasise what the reader will learn from the materials, e.g. *Are my pigs sick?* or *How to prepare rehydration solution* (Bembridge 1991; NCI 1994). | Facilitates comprehension and recall |
| Highlight important words (McKeon, 2003). | Helps to develop a sight vocabulary (lexical storage), and thereby aids word recognition (through lexical access) |
| **Style and language** | |
| Write as you talk, that is, use a conversational style (Doak et al. 1996, 78); and use peer language whenever appropriate (NCI 1994). | Increases motivation through personal involvement and enhances comprehension |
| Use simple, everyday terms, yet take care not to distort the scientific and technical facts (Morris & Stilwell 2003, 74–75). | Simplifies the decoding process, and enhances comprehension without compromising accuracy |
| If technical terms have to be used, explain them or give examples (Doak et al. 1996, 78). | Lowers text density and facilitates comprehension |
| Use the active voice (Doak et al. 1996, 78; PATH 2002, 40). | Decreases cognitive load caused by limiting syntactic transformation |
| Do not translate information verbatim; rather reconceptualise and rewrite in a language and style appropriate to the specific cultural group or community. | Enhances comprehension by linking to existing cognitive models |
| **GRAPHIC ELEMENTS**<br>**Visuals** | |
| Be aware of the sensory input level of the readers so as to draw them to the content of visuals (McKeon 2003). | Optimises visual perception |
| Use a visual on the cover (NCI 1994). | Motivates the reader to open the document; sets the tone and mood; facilitates comprehension by acting as an advance organiser. |
| Use pictures to illustrate the key points in materials for explanatory and instructional purposes (Leichter et al. 1981; Murphy et al. 1999). | Enhances comprehension and recall |
| Use captions (limited to about 15 words per line) together with visuals (Mayer et al. 1996; White 1988). | Facilitates comprehension and recall through dual coding; promotes literacy |

| Design heuristics | Reader effects |
|---|---|
| **GRAPHIC ELEMENTS**<br>**Visuals** | |
| Show familiar pictures that reflect cultural images (representing objects, style of dress, building styles, etc. that are familiar to the viewer) (NCI 1994; PATH 2002, 36). | Increases motivation (through positive affect) and facilitates comprehension (through linking to cultural schemata) |
| Use cues (such as arrows, a splash of colour, underlining, circling and magnifying,) to direct the eyes to important points (Doak et al 1996, 103; 106). | Optimises visual perception through enhancing acuity |
| Free images from clutter and distraction, and remove detail from the background to focus on key elements (NCI 1994). | Facilitates encoding and comprehension |
| Use visuals for testimonials (Doak et al. 1996, 111). | Gives realism to testimonials, which helps to capture and hold attention |
| **Layout** | |
| Make the general appearance attractive (Frost et al. 1999). | Helps to attract and keep attention |
| Make the purpose of the document immediately clear on the cover page (Morris & Stilwell 2003, 79). | Instils motivation to read |
| Arrange the text and visual material in the rest of the document to maximise the legibility of the text (Morris & Stilwell 2003, 79). | Optimises perception |
| Separate blocks of text and graphics by making use of enough white space (Velasco et al. 1996, 40). | Decreases cognitive load by helping to encode fewer chunks of information in working memory |
| Make headings stand out, but keep them close enough to the allied text in order to indicate their affiliations (NCI 1994). | Provides an overview to facilitate comprehension and recall |
| Restrict line length to between 50 and 70 characters in continuous text (Morris and Stilwell 2003, 79). | Increases readability (perception and encoding) |
| The space between letters must be less than the space between words, and word space must be less than the space between lines (Velasco et al. 1996). | Facilitates perception and encoding (word recognition). |
| Use left alignment rather than full justification, especially in the case of narrow columns or text wrapped around text boxes and graphics (Betterley 2000; Parker 1997; Velasco et al. 1996) | Facilitates readability as unequal spaces between words reduce reading speed, and justification may lead to lines being reread or skipped. |

| **Typography** | |
|---|---|
| The choice of type size and weight (boldness) is more important than the choice of typeface. So, never use font sizes smaller than 12 points (Glanz and Rudd 1990; NCI 1994) and never use light, spindly font types (e.g. Coronet, Future Light) that do not provide adequate contrast between text and background (Morris and Stilwell 2003, 79). Misanchuk's (1989) study (quoted by Morris and Stilwell, 2003, 79) of learners' preferences revealed that a Bookman 13 point font was preferred above all other type and size combinations. Type size will also partially be determined by characteristics of the typeface, for example x-height | Increases readability (decoding), and comprehension (through chunking, queuing and filtering of information) and enhances motivation to read. |
| Use fonts between 14 and 16 points for readers with poor eyesight (RNIB 2000, quoted by Morris and Stilwell 2003, 80) | Assists the reader in the perception phase |
| Use serif typefaces for continuous text and sans serifs for short sections of text that need to be highlighted or stand alone, such as headings and captions (Velasco et al. 1996). | Increases visual perception, decoding and comprehension (by emphasising queuing of information) |
| Do not use too many font types in one document, as it may distract or confuse the reader; preferably not more than two (Betterley et al., 2000). | Influences perception and comprehension (cognitive load) |
| Use variation in font types, as well as typographic highlighting (weight, slant, underlining and all caps) to emphasise important words, phrases or paragraphs (NCI 1994) and make the information structure of the document apparent (e.g. the information hierarchy; similar and different information types such as warnings, notes, instructions and captions) (Keyes 1993). | Enhances decoding, comprehension, recall and searching |
| Never use all caps for continuous text. Save this for labels, short headings, etc. Rather use a combination of upper and lower case. (Pettersson 2002; Schriver 1997; Velasco et al. 1996). | Affects perception and word recognition, thereby decreasing reading speed |
| **Colour** | |
| Colour must be used to attract and enhance and not detract and distract from the overall presentation of the message (Betterley 2000). This implies that not too many colours must be used in one document. | Affects attention and perception |
| Ensure good contrast between the colour of the paper and the colour of the print (Nitzke and Voichick 1992). | Good legibility enhances readability (visual perception) |
| Colour can be used as a backdrop for the printed text, but should not be so bright or dark that it reduces the legibility of the text. (NCI 1994). | Colour may serve as a stimulus to read. |

| Design heuristics | Reader effects |
|---|---|
| **Colour** | |
| Colour is very effective when used for queuing and filtering purposes, such as identifying the main points of the content, (e.g. the primary paragraph headings), highlighting summaries, warnings, preferred actions etc. (Keyes 1993; Morris and Stilwell 2003). | Helps to reduce cognitive load and enhance understanding |
| Use paper of sufficient density to render print invisible from one side of the page to the other (Betterley et al. 2000). | Minimises visual noise and enhances legibility. |
| Always pretest chosen colours on the intended audience (NCI 1994). Certain colours and colour combinations may be endowed with positive or negative connotations in particular cultures. | Affects emotional appeal and the motivation to follow the advice. |

## Conclusion

The aim of this article was to provide document designers and practitioners of adult literacy with a basic understanding of how the processing of printed materials by people with limited literacy differs from processing by literate people, and to provide guidelines on how textual variables can be manipulated to assist low-literates in retrieving the information they need to achieve particular goals.

It must, however, be kept in mind that target audiences differ significantly with regard to socio-demographic characteristics such as age, gender, occupation, income, religion, race, language, geographic location, attitudes and values. Understanding audience characteristics is of the utmost importance, since they have to be translated into textual characteristics in order to develop effective materials. Ongoing research is necessary to further clarify factors such as the extent to which experience of pictorial conventions influences picture perception and comprehension. Such research must also consider the role of the cultural background and physical environment as possible determinants of miscommunication. In addition, local research needs to be done on the relation between stylistic preferences and cognitive factors such as paying attention, being motivated to read, remembering the message, and being persuaded to follow the advice. A participatory approach, involving members of the intended user group throughout the process, is strongly advised.

Yet even if the design and development process is preceded by authentic audience research and audience participation, and the empirically-based advice given in the above matrix is followed, pretesting remains essential to ensure effectiveness. Key issues to probe are *attractiveness*, *comprehension*, (cultural) *acceptability*, *self-efficacy* (whether readers feel that they have the skills to carry

out the instruction), and *persuasiveness* (whether the message is able to convince the audience that they should take action) (Doak et al. 1996, 169; NCI 1994).

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BARBARA BASEL has worked for Project Literacy for the past 14 years. During this period she has been an ABET educator, a principal of one of the Project-Literacy/Ikageng Adult Education Centres, and the Coordinator of all of the Project-Literacy/Ikageng Adult Education Centres. Later she managed Project Literacy's Outsource Department and was responsible for the recruitment, training and monitoring of the ABET educators who facilitated classes for a variety of clients. She was Quality Assurance Coordinator for the Project Literacy/Ikhwelo Project, and it is her experience in this project that motivated her to write the paper exploring the pros and cons of using English as a medium of instruction in rural ABET Centres. She is both a qualified assessor and moderator, and currently works as a Quality Control Specialist for Project Literacy. In addition to her wide experience in the ABET world, Barbara has facilitated classes in Speech and Drama and English at primary and senior level

 

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LEILA SCHROEDER hails from the United States of America (USA). Before joining the Summer Institute of Linguistics (SIL) in 1981, Leila earned a B.A. in Education. She taught elementary school in the USA for nine years, and was involved in bilingual education for eight of those years. During that time she earned an MA in Urban Education with Bilingual Education Emphasis, and a Specialist Credential in Bilingual Education from the state of California. Since then, Leila has taught in four of SIL's literacy courses, as well as teaching Vernacular Literacy and ESL at Pan Africa Christian College (1994–97). She also participated in the first Africa Literacy Consultant Training seminar in 1997 and the first Multilingual Education seminar at UND in 1999. SIL 'loaned' Leila to Bible Translation and Literacy (BTL), a Kenyan organisation, where she served as a bilingual education and literacy specialist until 2002, whereupon she worked as a literacy consultant for SIL's Uganda-Tanzania branch. She returned to Africa in September 2004 as a literacy consultant for SIL's Bantu Initiative.

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KATHY ARBUCKLE studied Visual Arts at the University of Natal Pietermaritzburg (UNP) now the University of KwaZulu-Natal, majoring in printmaking. She has worked as an art educator of both adults and children, and has taught adult literacy. She has worked extensively as an illustrator. In 1995 she joined the Centre for Adult Education (CAE (UNP)) to work full time on the *Learn with Echo* project as a materials developer. She writes, edits, designs and illustrates for this weekly newspaper supplement which contains educational material aimed at adults with limited education. She also contributes to other publications and educational materials produced by CAE. Her main interests include illustration and design, writing in plain language at adult basic education levels, health education (particularly materials to do with HIV/AIDS), and the visual arts.

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