



Accessibility of South African Web sites to visually disabled users

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Key words: Visually disabled, Web accessibility, human/computer interaction, interface requirements

1 Introduction

1.1 General

This research explored the accessibility of South African Web sites to disabled users, with specific reference to visually disabled users. Visual disability or blindness has emerged as the most restrictive type of disability in the use of computers.

The inaccessibility of the Web to visually disabled users can largely be attributed to Web site design of poor quality. In an attempt to make Web sites more entertaining, designers tend to make elaborate use of graphics, animation and other multimedia, without using proper *html* coding techniques to support multimedia elements. These elements are then indecipherable to the tools that assist blind and visually disabled users to use the Web.

1.2 Importance of Web accessibility for disabled users

Web accessibility for disabled users is important from two perspectives. Firstly, people with disabilities represent a potentially significant force in the world economy. According to a United Nations estimate, approximately 10% of the world's population (600 million people) live with some type of disability, representing a significant number of people who could benefit from equitable access to the Web (Lilly 2001:398). According to Statistics South Africa, approximately 5% of the South African population is disabled in some way. Twenty-six per cent of these are visually disabled people. This substantial part of the population represents a significant section of the local market. It would therefore make sense for companies to include these people in their target audience – *inter alia* through sensitive design of Web sites to make them accessible to the visually disabled.

Secondly, Web accessibility for the visually disabled holds clear benefits for these Web users. According to Oravec (2002:452), some of these benefits include access and links regarding employment and support with regard to 'the formation and maintenance of community and group connections'.

1.3 Research question

The article focuses on the issue of whether or not South African Web sites are accessible to visually disabled people.

Although substantial research has been done on this topic internationally, limited information is available on the situation in South Africa. To fill this gap, this article reports on some exploratory research on Web accessibility in the South African context.

The study focused on the following questions:

- What makes a Web site accessible to the visually disabled?
- Are South African Web content developers aware of accessibility guidelines and the need for accessible Web sites?
- Do they follow these accessibility guidelines? Which guidelines are not being followed and why not?
- What is the effect of not following the guidelines in terms of problems detected in the design of South African Web sites?

1.4 Interaction between the visually disabled and the Web

For the purposes of this research, visual disability included complete blindness, colour

blindness and poor sight to the extent that a screen magnifier is required when working with computers. In the previous era of largely text-based systems, it was relatively easy for a visually disabled person to interact with the computer. A screen reader card read all the information on the screen back to the user. The emergence of the graphical user interface and the World-Wide Web made computers simultaneously more and less useful to the visually disabled. Now it is easier than ever for visually disabled people to make travel reservations, purchase goods and make enquiries without being limited by their disability. However, it is also becoming increasingly difficult to access information on the Web because of the extensive use of graphics, animation and other multimedia.

Visually disabled users can interact with the computer in numerous ways when accessing information on the Internet:

- Screen readers can only read text that is printed (not painted) to the screen and are most commonly used in the case of total blindness.
- Braille embossers translate computer-generated text into embossed Braille output for blind users, but cannot transfer graphics or any other non-textual elements.
- Screen magnifiers magnify a portion of the screen up to factor 16, for easy viewing, which is useful for users with poor vision.
- Speech recognition systems enable the user to give voice commands for entering data, as opposed to using a keyboard. The systems need to be trained to 'understand' the language and grammar of the user – a time-consuming process that often delivers unsatisfactory results.
- Some other commonly used techniques include switching graphics display off in the browser and increasing the font size on a page. This is only possible if both the browser and the Web site allow such changes.

Although these supportive technology tools (user agents) are useful, they require the Web site to be designed in accordance with some generally accepted guidelines and standards. In this regard, the World Wide Web Consortium's Web Accessibility Initiative provides useful techniques for Web accessibility guidelines that set specific standards for meeting the needs of this user group (Vanderheiden and Chrisholm, 1998). If a Web site complies with these guidelines, it is generally accepted as being accessible to the disabled.

In some countries, such as the United States and Canada, government Web sites are required by law to be designed according to these guidelines (Yu 2002:408). Some effort is being made to have this legislation applied to commercial Web sites. South Africa has made little attempt to pass similar legislation, although the *Electronic Communications and Transactions Act* of 2002 does indeed encourage 'the private sector to initiate schemes to provide universal access' (South Africa 2002).

1.5 Outline of the research

The main aim of this research was to focus specifically on whether or not the design and layout of South African Web sites catered for the needs of visually disabled Internet users. The research was done in three parts:

- Firstly, an investigation was done on the basis of existing literature to determine the requirements for a Web site to be accessible to visually disabled users. The conclusions in this regard were primarily based on the Web Accessibility Initiative's *Techniques for Web Content Accessibility Guidelines 1.0*.
- Secondly, questionnaires were sent to South African Web content developers to find out whether or not they were aware that their Web sites needed to be accessible to the visually disabled.
- Finally, an on-line evaluation of the accessibility of selected South African Web sites

was performed using Bobby 3.2 – an on-line accessibility evaluation tool created by the Centre for Applied Special Technology.

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2 Guidelines for accessibility

A Web site is regarded as being accessible when any person can retrieve the information on the site, including people with visual, hearing, physical and learning disabilities (Lilly 2001:401).

Web content designers face various challenges within the context of accessibility. Firstly, the easiest way to accomplish this would be to offer a text-only alternative version of any page on a Web site; text-based information is significantly easier to read with a screen reader than are multimedia presentations. The problem with this method of making a Web page accessible is that it requires significant time and effort on the part of the Web site designer. A second challenge is that most Web content developers are under the impression that making their Web sites accessible to the disabled will result in the sites becoming boring and uninteresting (Vaas 2000:64). Thirdly, developers do not know where to start when attempting to convert a Web site to an accessible format. An effort is being made by several institutions to alter these perceptions and improve universal Web content accessibility. The World-Wide Web Consortium (W3C) (Chrisholm, Vanderheiden and Jacobs 2000) has probably made one of the most significant contributions by publishing the *Techniques for Web Content Accessibility Guidelines 1.0* as part of their Web Accessibility Initiative. These guidelines provide a set of recommendations for accessible Web site design and aim at making Web sites accessible to a computer user with any kind of disability.

Recommendations by the W3C are classified as follows:

- Priority 1 checkpoints – A Web content developer must conform to these guidelines in order to make it possible for all computer users, including those with disabilities of some kind, to access the information on a Web page.
- Priority 2 checkpoints – By paying attention to these checkpoints, a Web content developer can remove significant accessibility barriers in a Web site. However, these are not mandatory.
- Priority 3 checkpoints – These are not crucial guidelines and they generally only make a Web site more comfortable for a disabled person to use. The information can still be accessed even if these recommendations are not followed.

The W3C's Web Content Accessibility Guidelines (WCAG) are the guidelines most widely used by the developers of commercial Web sites to make them more accessible to the disabled, and many governments have also started passing legislation to encourage accessible Web site design (Oppenheim and Selby 1999:337). The guidelines cover textual elements, multimedia, links, style sheets and lists, frames and forms, and navigation, among other things. Some of the errors are briefly listed in the discussion of the research findings in a later section.

If these guidelines are followed, a Web page is regarded as being accessible to the majority of Internet users. If a Web content developer is unable to make a Web site conform to at least priority 1 guidelines, it is recommended that the site be linked to a Web site with similar information that is accessible to visually disabled users.

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3 Awareness of South African Web content developers

3.1 Outline of the survey

In the course of this survey, the Web site developers of 80 Proudly South African companies were e-mailed a questionnaire regarding Web content accessibility. In the questionnaire they were asked for their opinions on Web accessibility to visually disabled users, as well as whether or not they regarded their own organization's Web sites as accessible. The questionnaire also tested their awareness of the WCAG and their willingness to conform to such guidelines.

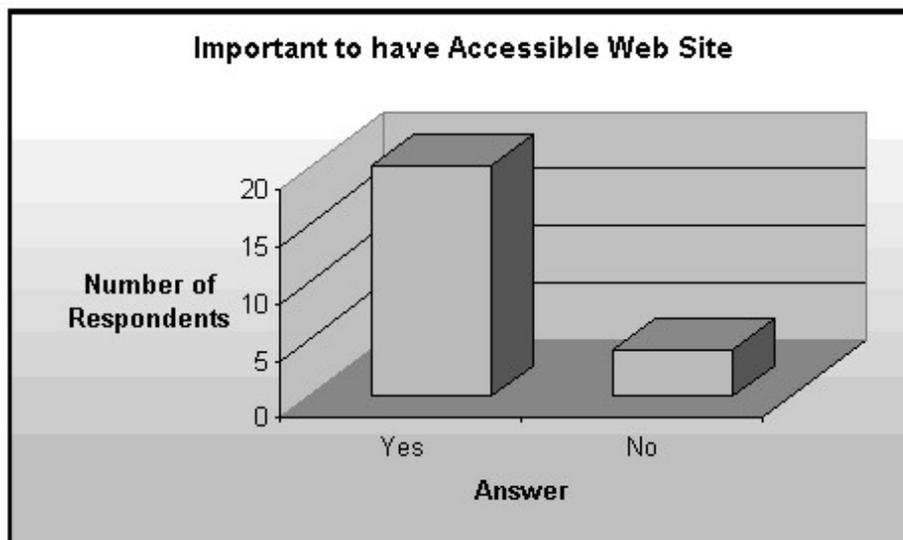
The list of Proudly South African companies was targeted as recipients of the questionnaire as they were thought to provide the best representation of the South African corporate landscape. The 80 companies chosen were randomly selected from this list, although care was taken to ensure that a broad spectrum of interests was covered. This included government departments, non-profit organizations, education, both large and small public sector companies, and private companies.

A response was received from 24 of the companies. Although most companies that responded considered it important to have a Web site that is accessible to the visually disabled and recognized this group as users of the Internet, very few were aware of existing guidelines for Web accessibility and only a small minority had given any consideration to making their own Web sites accessible. Also, most companies had no intention of ever paying any attention to the accessibility of their sites. In the section that follows, the information gathered from these companies is discussed in greater detail. Some general conclusions on the survey are provided in section 3.3.

3.2 Response to the questionnaire

Question 1: Is it important for a company to have an accessible Web site?

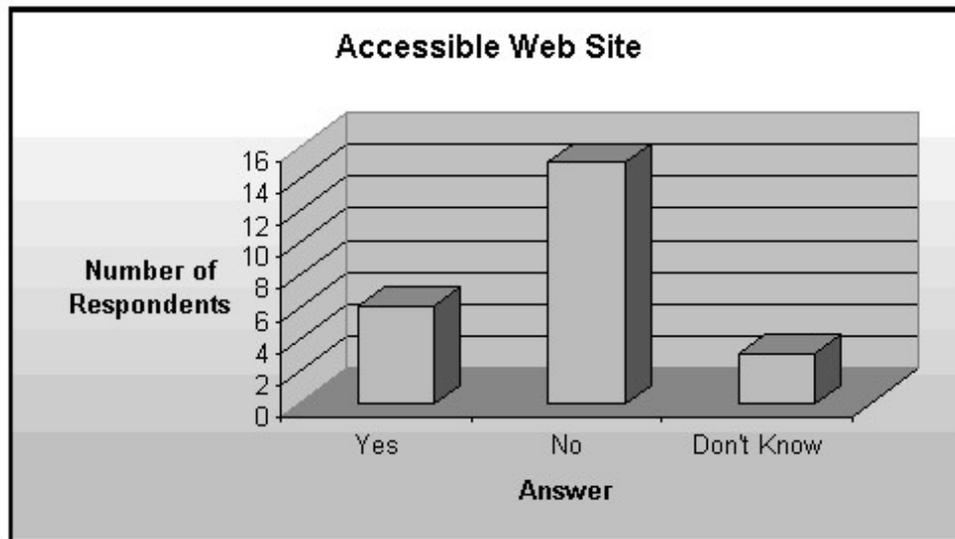
Figure 1 Graphical representation of response to Question 1



Eighty-three per cent of respondents indicated that they considered an accessible Web site to be important (Figure 1). Most respondents emphasized that it depends on the company and its primary target market. However, there was a general feeling that government and e-commerce Web sites should definitely be accessible to the visually disabled. One respondent noted: 'The biggest problem with many corporate sites [ones that should be accessible to all], is that they have taken the flash route with no consideration for usability, accessibility and download times.'

Question 2: Do you think that your Web site is accessible?

Figure 2 Graphical representation of response to Question 2

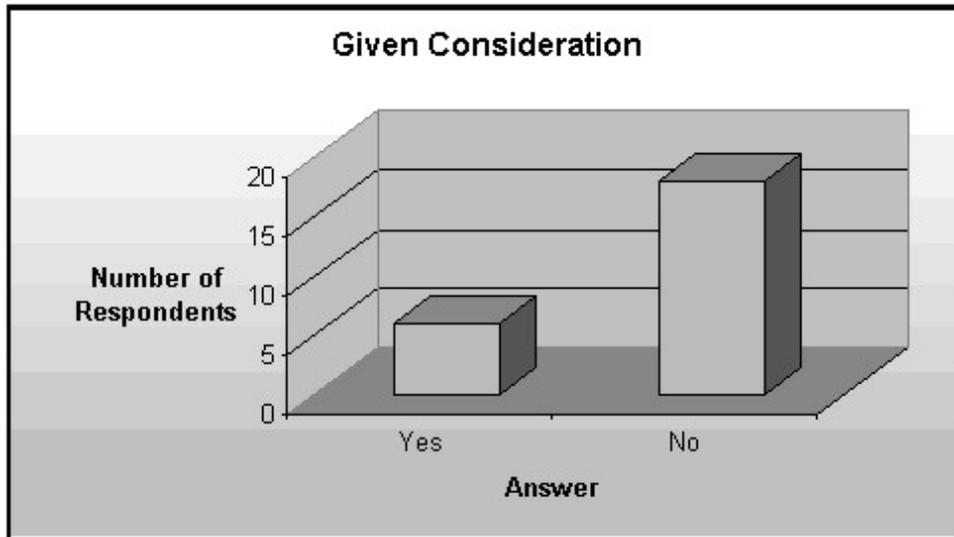


Respondents were asked to give their own opinion on the accessibility of their sites (Figure 2). This was done to ascertain whether what developers regard as accessible correlates with the W3C's Web accessibility guidelines.

The majority (63%) of respondents did not regard their own Web sites as accessible and 12.5% did not know or had not given the matter any thought. Some respondents indicated the use of simple *html* programming (omitting the use of applets and other media) as a step in the direction of making the sites accessible. Some of the respondents indicated that they were in the process of making their Web sites accessible. Only one respondent regularly tested the accessibility of the company's Web site (by making use of the Lynx text-based browser). Three of the respondents had blind people working in their companies who make regular use of the Web site. In all these cases, the Web sites were regarded as fully accessible when the blind employees could use their screen reader software to access content on the sites. Interesting to note is the fact that these companies did not make use of any guidelines to make these sites accessible. Rather, the blind employees gave feedback and suggestions, and the Web site was adjusted accordingly.

Question 3: Have you given consideration to making your site accessible?

Figure 3 Graphical representation of response to Question 3



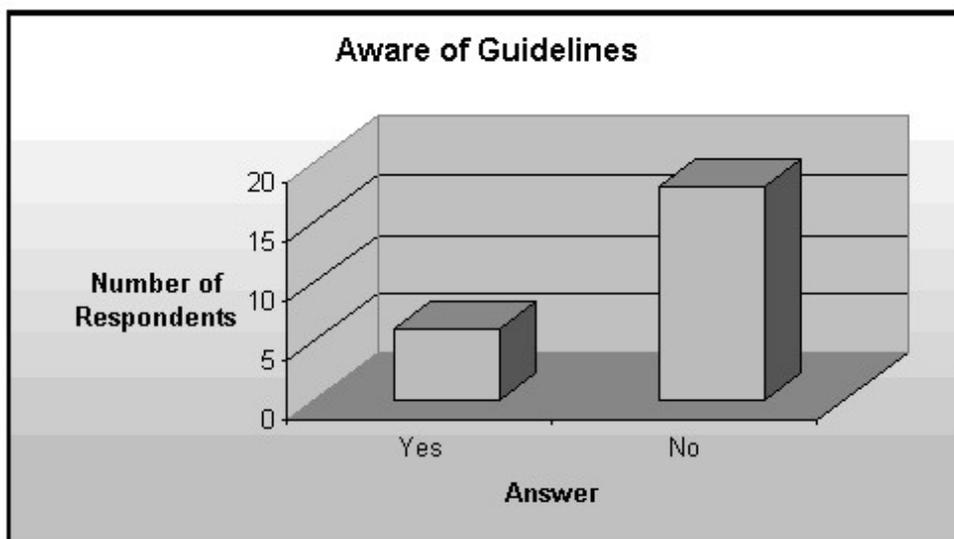
Although a quarter of the respondents gave some thought to making their Web sites accessible, this was not nearly enough to indicate that Web developers in general considered accessibility a priority (Figure 3). Some of the respondents noted that the reply to the survey constituted the first time they had thought about the subject.

Apart from a lack of awareness, the following are the main reasons respondents supplied for not taking steps to ensure accessible Web sites:

- They could not find anybody to convert their existing site to an accessible one.
- The IT department was waiting for business to drive the initiative.
- It was expensive to build and maintain more than one Web site.
- Many of the developers were under the impression that they had to make use of sound and built-in sound bites to make their Web sites accessible. They did not consider the design of a site that relied entirely on sound to be economically viable.
- Some claimed to have had no requests from the public in this regard and indicated that they would follow international trends.

Question 4: Are you aware of the Web Content Accessibility Guidelines?

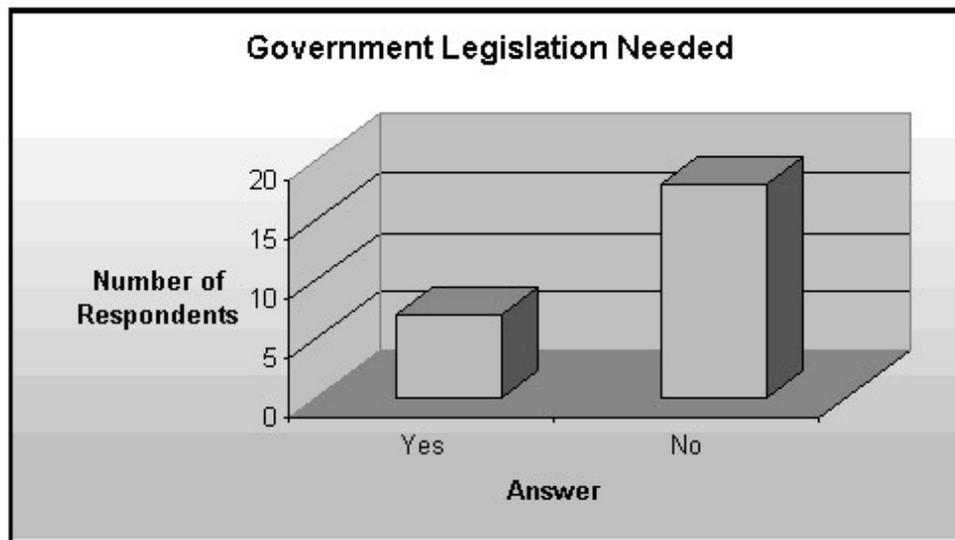
Figure 4 Graphical representation of response to Question 4



Several respondents admitted that they were not aware of the WCAG, but asked for more information. Twenty-five per cent of respondents were aware of the guidelines and, of that group, 83% indicated that they were developing their Web sites in accordance with the guidelines (Figure 4).

Question 5: Should government be allowed to pass legislation to make accessible Web site design compulsory?

Figure 5 Graphical representation of response to Question 5



This question undoubtedly elicited the strongest response (Figure 5). The respondents who were in favour of such legislation advanced the following reasons for wanting the government to take action in this regard:

- Web sites are generally user-unfriendly even for sighted people, with no consideration being given to download times etc. Government intervention could result in a campaign to educate everyone as far as accessibility is concerned and thus benefit both the sighted and the visually disabled.
- E-commerce and educational Web sites should be accessible to the visually disabled in order to be useful to all the members of a community. One respondent asserted that 'if it is an e-commerce shopping site, you should make the site accessible for the disabled, just as you would if you were selling the goods on the street. Same goes for educational sites: disabled people go to universities, which have special facilities in place for them, why not do the same on a Web site? There should be no discrimination.'
- These respondents felt that everybody should have the freedom to explore the Internet and have access to public information.
- There was a strong feeling that all government sites from national to local level should be certified as accessible because this was a public service that should be available to all citizens.

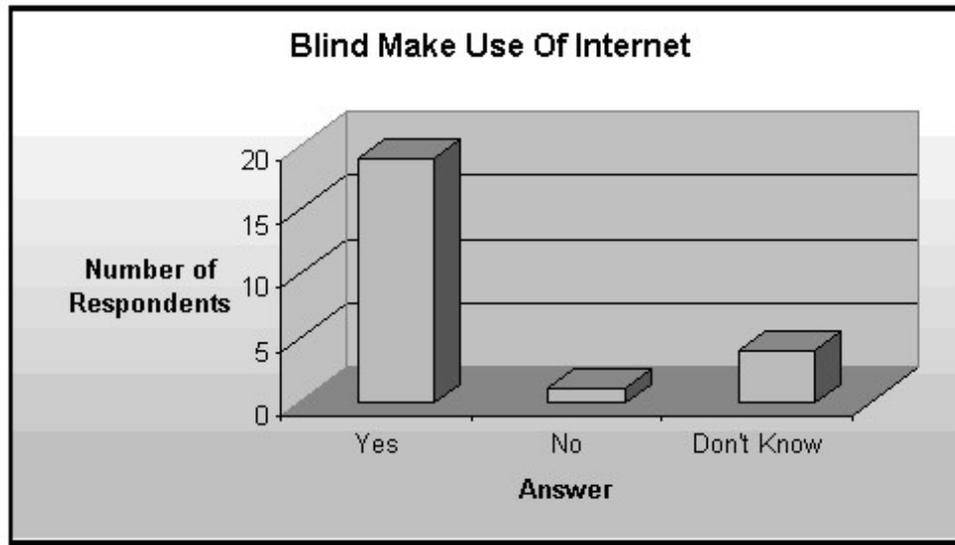
In spite of the arguments above, 70% of respondents felt that government intervention would be unjust. The main reasons provided for this contention were as follows:

- The government should not own the Internet.
- It would be impossible to enforce such legislation.
- Making South African Web sites accessible would be of no use if international sites were still inaccessible.
- The visually disabled constitute a minority group and in a democracy this means that

- they have to go along with what the majority of people find most convenient.
- Respondents saw redesigning of Web sites for accessibility as impractical and unnecessary.
 - Not all companies regarded the visually disabled as part of their target market and having to abide by laws that force them to have accessible Web sites would, in their view, be an unjustified expense.

Question 6: Do you think that blind and visually disabled people make regular use of the Internet as a source of information?

Figure 6 Graphical representation of response to Question 6



It is interesting to note that only one respondent did not see the visually disabled as regular Internet users (Figure 6). It had not occurred to some respondents that visually disabled people would *want* to use the Internet as a source of information (indicated in Figure 6 as 'Don't Know'). As one respondent remarked: 'It has never even occurred to me that the blind and visually disabled can use the Internet. I can only imagine that they surely would want to.'

In spite of this, the majority response (80%) was that visually disabled users did make use of the Internet on a regular basis (with 'regular basis' meaning daily or whenever they need information).

3.3 Conclusions drawn from the survey

Table 1 Summary of conclusions

Response	Percentage
Respondents who regard it as important for a company to have an accessible Web site	83.3%
Respondents who consider their Web sites to be accessible	25.0%
Respondents who have given consideration to making their sites accessible	25.0%
Respondents aware of W3C guidelines	25.0%
Respondents following W3C guidelines	20.8%
Respondents aware of guidelines who are also following them	83.3%

Government legislation to make all sites accessible would be fair	29.2%
Respondents who think that visually disabled people use the Internet	79.2%

A large majority of respondents regarded the visually handicapped as regular Internet users *and* were aware of the importance of having an accessible Web site. In spite of this, only a quarter of these people had made any effort to ensure that their own sites were accessible. Moreover, only 20% of respondents were even aware of the most widely published guidelines on Web accessibility, namely the WCAG.

The survey results indicate that although people seemed to be aware of the needs of the visually disabled community, they had no clear idea of how to go about satisfying these needs. It can also be concluded that government interference on the matter of Web accessibility would not be desirable from the perspective of the companies that participated in the survey. However, an educational campaign on the matter of Web accessibility was desperately needed, as people had no idea what Web accessibility entailed, or how to make a Web site accessible. Thus the initial contention that South African Web content developers were neither aware of accessibility guidelines nor how to make their Web sites accessible, seems to be supported within the exploratory context of this research.

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4 The Bobby test

4.1 Introduction

The Bobby test was performed to answer the following questions:

- How many of the Web sites are actually accessible?
- Which guidelines are not followed?
- What is the effect on accessibility of not following the guidelines?

4.2 About the Bobby test

The Bobby 3.2 on-line accessibility test that was developed by the Centre for Applied Special Technology, was used to test the Web sites. Bobby evaluates Web pages for Priority 1, 2 and 3 accessibility according to the W3C's Web accessibility guidelines. In this evaluation, Priority 2 W3C accessibility, the preferred minimum conformance level, was used as the minimum standard for acceptability.

According to McCord, Frederiksen and Campbell (2002:190), a Web site must comply with the following requirements in order to meet the Bobby standards:

- Provide textual equivalents for all images and multimedia content, which would include video, audio and animation.
- Provide alternative methods of presenting colour-based information.
- Data table headers need to be identified and line-by-line reading of tables should be possible.
- Graphs and charts have to be summarized.
- All document language and other language changes need to be identified.
- All content must be well structured.
- Alternative content has to be provided in the case of features that are not universally supported (such as applets and plug-ins).

4.3 Results of the evaluation

- After doing the Bobby test on all 24 Web sites that participated in the survey in section three, eighteen types of errors were identified in the Web pages: four Priority 1 accessibility problems; nine Priority 2 accessibility problems; and five Priority 3 accessibility problems.

Five of the 24 Web sites evaluated were created using Flash. Because Flash Web sites do not generate any *html*, they are considered to be completely inaccessible because the screen readers of blind users cannot retrieve any information from them. Therefore, the rest of this chapter will focus only on the Bobby reports for the remaining 19 Web sites that were created using *html*.

4.3.1 Number of accessible Web Sites

Figure 7 Percentage of Web sites passing various W3C accessibility levels

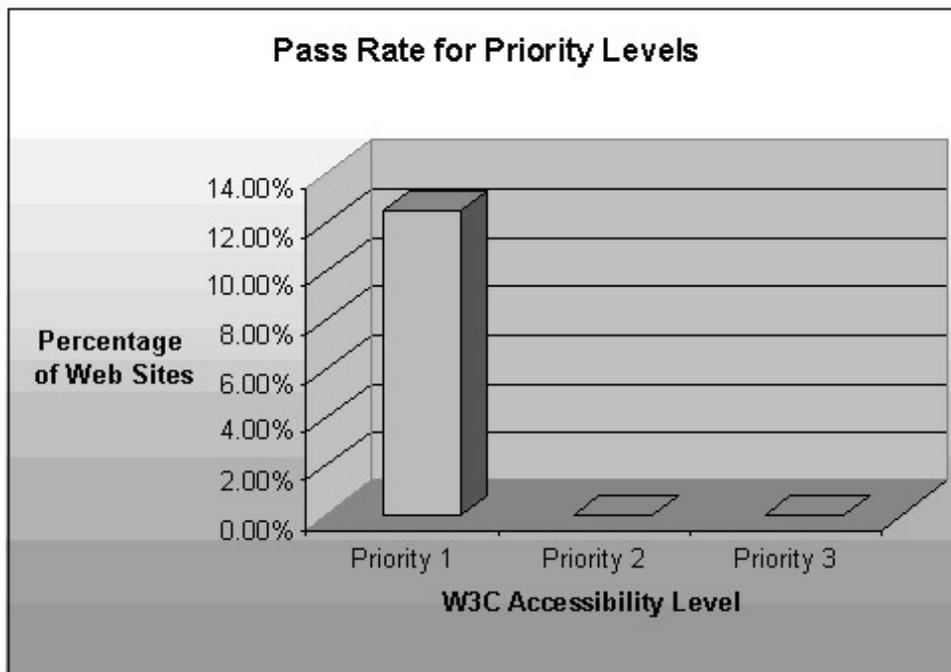


Figure 7 indicates that only 12.5% of the Web sites passed the Priority 1 accessibility test, whereas not one of the Web sites passed either the Priority 2 or Priority 3 accessibility test. It can thus be concluded that none of the Web sites evaluated in this study are accessible to visually disabled users, as a Web site needs to conform to Priority 2 accessibility before being regarded as accessible. Within the context of this research, this serves to support the initial perception that the majority of South African Web sites may be inaccessible to the visually handicapped.

4.3.2 Guidelines not being followed and the effect

Bobby detected 18 types of accessibility problems in the Web sites that were evaluated:

- Priority 1 accessibility errors:
 - No alternative (ALT) text used for applets
 - No alternative text used for images
 - No alternative text used for image buttons
 - No alternative text used for image maps.

Figure 8 Priority 1 errors on South African Web sites

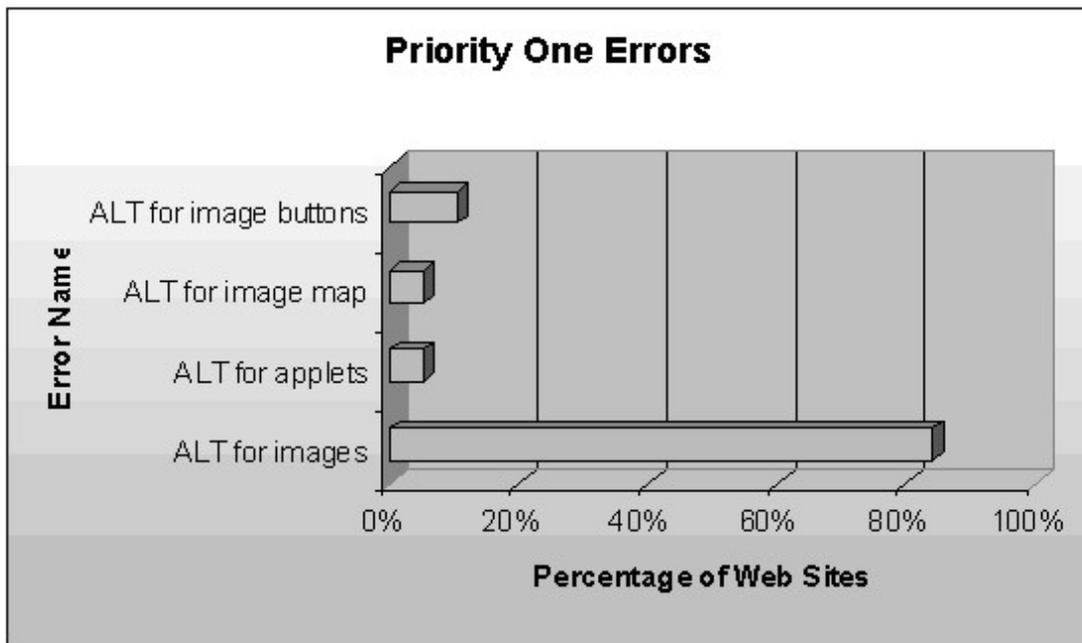


Figure 8 indicates that the most common of these errors was not using alternative text for images, with over 80% of Web sites showing instances of this error. It is interesting to note, however, that the only reason that the remaining errors occurred less often was because those elements were not used as often in Web page design.

- Priority 2 accessibility errors:
 - Developers made use of scrolling marquee elements, which could be confusing to visually impaired users
 - Event handlers requiring the use of a mouse
 - Link phrases did not make sense
 - Headings were not nested
 - Omission of the public text identifier
 - Web sites were developed using fixed rather than relative sizing for page content
 - Using the same link phrase for different URLs.

Figure 9 Priority 2 errors on South African Web sites

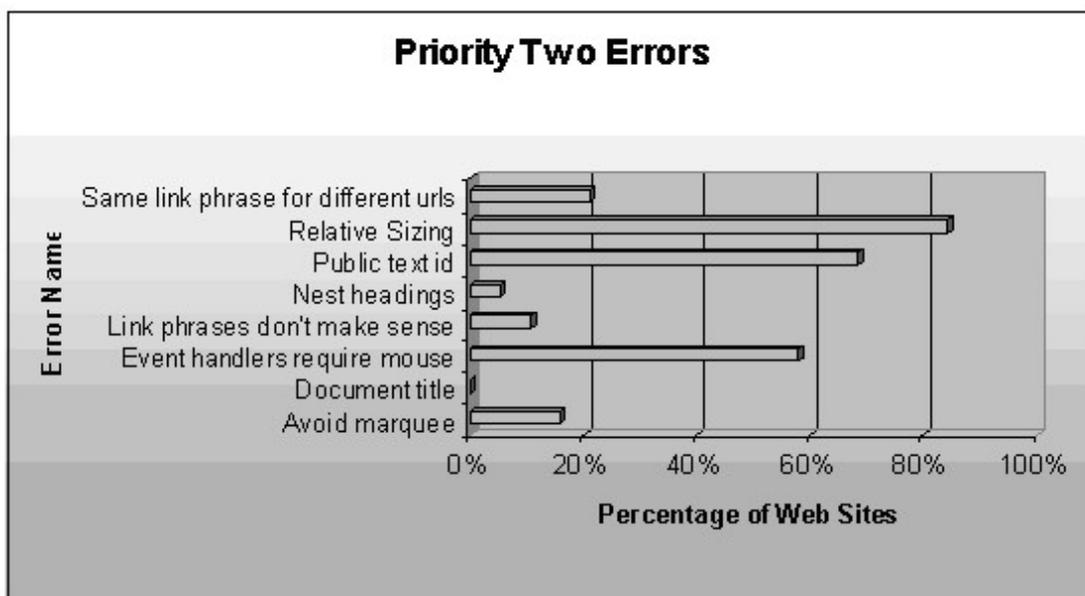
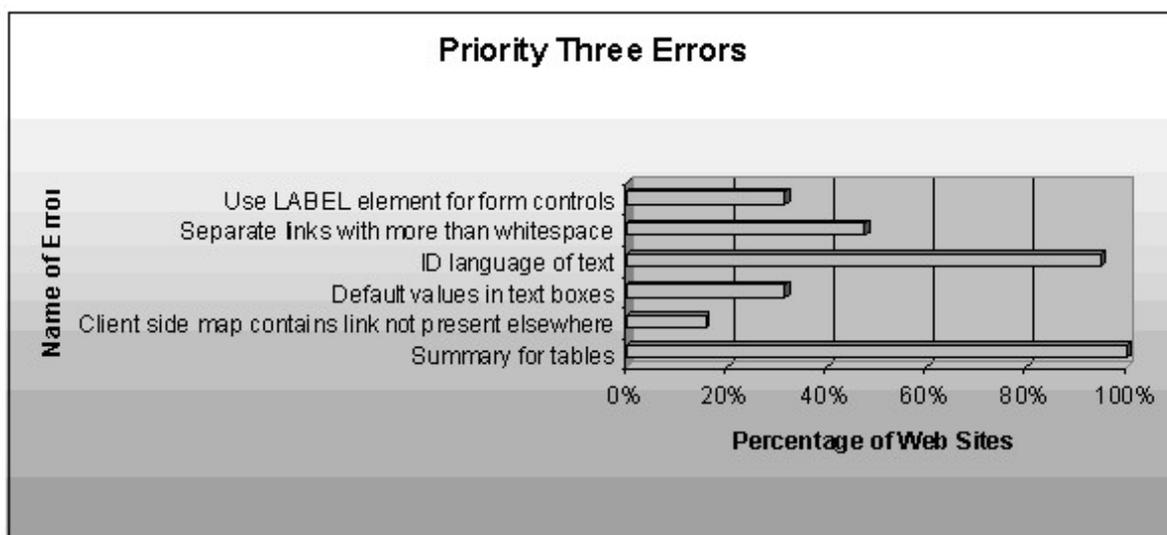


Figure 9 shows that there was a large incidence of errors of this type. Although Priority 2 accessibility is not quite as important as Priority One accessibility, Web content designers should nevertheless not neglect it, as seemed to be the prevailing practice. The most common errors here were not using relative sizing, not providing a public text identifier and using event handlers that required a mouse, with over half of the Web sites making these errors. The graph also indicates some less common errors. It seemed that most Web sites made use of nested headings, provided documents with titles, contained informative and useful link phrases and avoided the use of scrolling marquee text.

- Priority 3 accessibility errors:
 - Failing to provide summaries for tables
 - Client side maps that contained links not present elsewhere
 - No default values provided in text boxes
 - Language of the text not identified
 - Links were only separated using whitespace
 - Not using the LABEL element for form controls.

Figure 10 Priority 3 errors on South African Web sites



Priority 3 accessibility errors seem to be receiving little attention from Web site designers (Figure 10). None of the Web sites evaluated provided summaries for their tables, and over 90% of Web pages gave no indication of the language of the page. Another error that occurred quite often was the use of whitespace to separate links. In general, there was a high incidence of these errors – a problem that needed not to be solved immediately but should receive some attention as soon as other priority level requirements are met.

In conclusion, none of the five Web sites that the developers considered to be accessible conformed to the requirements. Although four of the Web sites evaluated were almost accessible, none was completely accessible. It seemed that South African Web content developers did not pay sufficient attention to accessibility of Web sites.

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5 Summary and conclusion

5.1 Research summary

The exploratory research reported on in this article indicated that South African Web Content

developers were not applying accessibility guidelines and many of them were not even aware of the existence of these guidelines. All the Web sites evaluated proved to be inaccessible to the visually disabled, despite the fact that 83% of the companies that participated in the survey indicated that they think it is important for a company to have an accessible Web site. A quarter of the companies regarded their Web sites as accessible, an assumption that was proven wrong by the tests reported above.

5.2 Conclusions

These findings mean that visually disabled South African consumers will probably struggle to conduct business or extract information on South African Web sites. This seems to imply a disregard by companies of the needs of their disabled customers, which could lead to the loss of these customers and income that could have originated from them. Inaccessibility of Web sites to visually disabled users may possibly be regarded as a form of discrimination, which could well result in future pressure on companies to rectify this injustice.

5.3 Suggestions for further research

One of the limitations of this research was that the survey was only exploratory and therefore was undertaken on a limited scale. Further research on a larger scale could strengthen support for the hypothesis that Web accessibility in South Africa is not up to standard.

A further recommendation is that research should be undertaken to investigate ways of getting companies actively involved in a campaign to improve Web accessibility.

Finally, the economic and social implications of Web inaccessibility for companies as well as individuals should be investigated. This could provide some motivation for companies to make their Web sites accessible.

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ISSN 1560-683X

Published by [InterWord Communications](#) for Department of Information and Knowledge Management,
University of Johannesburg