

Chapter 3: Considerations when designing and developing a web site

3.1 Introduction

This chapter comprises a comprehensive study of the literature on all aspects to be considered when developing a web site. A variety of issues need to be investigated. The success and usability of a web site depends on to a large extent on the choices made in the development and design phases. The use of multimedia, web usage, users and barriers to use will be discussed. The use of Hypertext Markup Language (HTML), authoring tools and an Electronic Performance Support System (EPSS) should be discussed and evaluated, with a view to selecting what is most appropriate for the purpose of this web site. Various structures of web sites should be compared to make the best choice. Aspects of the design of a web site relating to text design, screen design and navigation will be described for implementation in the proposed web site.

3.2 Specifications for developing a web site

Computer design requires specificity in articulating design, scripts, displays and logic, beyond that required for any other environment (Gery, 1987: 93-110; Gery, 1991: 94; Howard & Terry, 1997:1; Lappas & Kekkeris, 1996:1). The look and feel, proposed structure and navigation system of the proposed web site should be identified (Collis & Verwijs, 1995a: 24; Gery, 1991: 95-96; Vaughan, 1994: 24; Vaughan, 1998:13). The objectives of the development process or methodology should be specified before any work is done.

These *specifications* should include:

- the timely production of high quality web sites if correctly defined;
- the usage in practise (interactivity levels) must be determined by looking at:
 - what the product should do?
 - what the product should be like?
 - how will it be used?
 - will the proposed user use it?;
- messages and objectives to be covered (content and structure); and
- ways in which this message and/or objectives will be identified, and the understanding redefined to adapt to the demands of the user (design and screen displays) (Adendorff, 1999:5; Collis & Verwijs, 1995a:24; Gery, 1987:93-96; Gery, 1991:95-96; Howard & Terry, 1997:1-2; Lappas & Kekkeris, 1996:1; Vaughan, 1994: 24; Vaughan, 1998:14).

3.3 Elements of instructional design of importance in developing a web site

Gagne's nine events of instruction must also be kept in mind when designing web screens, to ensure that maximum benefits are derived from using a specific web site.

These are:

- gaining attention;
- informing learner of objectives;
- stimulating recall of prior learning;
- presenting stimuli with distinctive features;
- eliciting performance;
- providing and assessing feedback;
- enhancing retention and learning transfer;
- stimulating change; and
- appealing to the learner's interest (Anand, 1998:1-4; Adendorff, 1999:8; Howard & Terry, 1997:1; Mager, 1991:6; Reeves, 1998:1-14).

Keller's ARCS (Attention, Relevance, Confidence and Satisfaction) model is also a way to incorporate design elements and determine whether the web site has been developed satisfactorily, to select the design which will be most effective to motivate the learner (Howard & Terry, 1997:1; Main, 1993: 37).

Bloom's Cognitive Taxonomy is a well-known guide for cognitive learning outcomes (Ross, 1993:11). There are six categories or levels in this taxonomy:

- knowledge;
- comprehension;
- application;
- analysis;
- synthesis; and
- evaluation (Ross, 1993:11-12).

Each of these levels represents a higher order of thinking skills. Provision must be made in the site design and structure to ensure maximum benefit from the contents of the site. Learning can be defined as “ a change of human disposition or capabilities, which can be retained and which is not simply attributed to the process of growth “ (Anand, 1998:1). When designed effectively, a web site can ensure that learning takes place.

3.4 The use of multimedia

The use of multimedia has increased immensely and can be applied to almost everything. The possible use of multimedia, when developing an information resource for dairy farmers can be considered. Multimedia is used in different areas of daily life, ranging from games to stock market information. Multimedia can also be used for

presentations, training, marketing, advertising, demonstrations, databases, catalogues and network communications (such as video conferencing, and voice mail). It can also be used in schools for the improvement of reading skills, as teaching tools and for generating school reports and newspapers. At home it can be use for games, information gathering and shopping. In shopping malls, movie theatres, shops and banks it can be used for an information kiosk or help stations. Multimedia can also play a role in virtual reality applications, where skills may be learnt or improved on, or new adventures experienced. (Fraundorf, 1999:1; Lappas & Kekkeris, 1996:1; Multimedia, 1999:1; Najjar, 1995:129; Vaughan, 1994:4; Vaughan, 1998:4; Why use multimedia training, 1999:1).

3.4.1 Multimedia

Multimedia is a woven combination of text, graphics, high quality sound, animation and video, delivered by computer or any other electronic means (Lappas & Kekkeris, 1996:1; Najjar, 1996:129; Stratfold & Laurillard, 1993:488). Multimedia presents a fundamental shift in how we conceive and present information (Lappas & Kekkeris, 1996:1; Petersen, 1999:1). It may provide individual users with high levels of control and interaction. The term multimedia can also be used to describe entertainment systems and other electronic products and services, especially those of an interactive nature which combine text, sound and video. (Fraundorf, 1999:1; Multimedia, 1999:1; Multimedia, why use multimedia, 1997:1; Najjar, 1996:149; Petersen, 1999:1; Stratfold & Laurillard, 1993:488; Vaughan, 1994:4; Vaughan, 1998:4; Why use multimedia training, 1999:1). Multimedia is a powerful and efficient source for acquiring information and learning a new skill (Bass, 1997:4-5; Lappas & Kekkeris, 1996:1; Najjar, 1996:132; Sloss, 1995:2).

3.4.2 Hypermedia

Hypermedia provides a structure of linked elements through which the user can navigate, or refers to the switching from media to media offered by CD-ROM.

3.4.3 Linear multimedia

Linear multimedia allows the web site or project to run from the start to finish without any deviations.

3.4.4 Interactive multimedia

Interactive multimedia is a “hybrid technology” and combines the storage and retrieval capabilities of computer database technology with advanced tools for viewing and manipulating these materials (Bass, 1997:2; Najjar, 1996:131; Petersen, 1999:1; Why use multimedia training, 1999:1). The materials are packaged, integrated and linked together to allow the user to browse, navigate and analyse these materials through various searching and indexing features (Bass, 1997:2-3). It is user-centred. The user controls the experience by controlling all aspects of the web site (Bass, 1997:3; Najjar, 1996:132). Interactive multimedia web sites enable the user to manipulate the materials through a wide variety of powerful linking, sorting, searching and annotating activities (Bass, 1997:5; Bates, 1995:194; De Jong & Sarti, 1994:1-5; Lappas & Kekkeris, 1996:1-2; Multimedia: why use multimedia, 1997:1; Sloss, 1995:5-6).

3.4.4.1 Advantages of interactive multimedia

According to the literature, interactive multimedia has many advantages. This list was compiled from the following sources: Bates (1995:191, 192); Dunbar (1998:2); Multimedia: why use multimedia (1997:1, 2); Why use multimedia training (1999:1); and Why use multimedia (1998:1).

- It provides information on demand, during a break, lunch, before work at any time convenient throughout the day.
- It accommodates different interests and by allowing individual access to information.
- It can be broken down into manageable blocks of information.
- Different products or services can be accessed at the touch of a button.
- It accommodates varying styles of learning and use.
- It can be used when users are dispersed geographically.
- It provides a rich learning environment.
- It increases learning and retention.
- It forces the user to get involved.
- It enables the user to make judgements in a safe, controlled environment.
- It is individualized and can be self-paced by the user.
- It provides a simulation capability.
- It allows interactivity and practice.

3.4.5 Nonlinear, interactive multimedia

With nonlinear, interactive multimedia the user has navigational control to wander through the content at will (Bass, 1997:4; Fraundorf, 1999:1; Multimedia, 1999:1; Vaughan, 1994:4; Vaughan, 1998:4; Why use multimedia training, 1999:1). It has the capacity to deliver large amounts of material in multiple forms, and in an integrated environment, allowing users to control the reading and viewing experience (Bass, 1997:4; Multimedia: why use multimedia, 1997:1; Sloss, 1995:5; Why use multimedia training, 1999:1)

3.4.6 Desktop multimedia

Desktop multimedia has the following characteristics:

- it integrates two or more media effects (text, graphics, sound, video, and animation) to convey a message or tell a story;
- it is designed to be viewed and interacted with on a computer; and
- it allows user to browse through information in any sequence (Lappas & Kekkeris, 1996:1).

3.4.7 Why choose multimedia?

Over the past number of years many attempts have been made to use databases to provide information, but not always with great success. A person can remember only about 10% of what is read; 20% of what is heard; 30% of visuals related to what was heard; and 50% if watching someone do something while explaining it. Almost 90% is remembered, if doing the job themselves even if only as a simulation (interactive nonlinear multimedia) (Bass, 1997:5; Multimedia: why use multimedia, 1997:1).

Multimedia systems work one-on-one with each user and is customised to fit each user's needs. The learning experience is also personalized (Bass, 1997:5; Bates, 1995:8; Sloss, 1995:6-7; Why use multimedia training, 1999:1).

Scientific information on the Internet usually consists of text only, with a few applicable illustrations and photo's. Other web sites use flashy colours, loud music and a variety of graphics (Douglas, 1998:4).

The use of multimedia to educate, train or inform people on various subjects should grow as more and more people have access to high quality computers or the Internet. As more and more people become not just computer literate, but able to utilise the full potential of the computer and all the services offered by it, such as word processing, spreadsheets, animation, gathering and retrieval of information, use should increase even more (Dunbar, 1997:1; Fraundorf, 1999:1; Multimedia, 1999:1; Vaughan, 1994:4; Vaughan, 1998:4; Why use multimedia training, 1999:1).

Desktop multimedia was chosen for this web site as a way of presenting a limited capability multimedia project. It offers the advantages of nonlinear interactive multimedia. This specific web site should be limited to text and graphics due to limited capabilities of the target group. The user should be able to interact with the web site, and to work through the web site in any sequence.

3.5 The use of the World Wide Web (WWW)

The use of the World Wide Web to make information available, is one of the best ways of informing members of the public of new technologies (Bates, 1995:2; Millheim & Harvey, 1998:53, 56; Tognazzini, 1999:1). A World Wide Web environment can be defined as a set of web screens, which is an integrated whole and which serve a common goal (Davies & Samways, 1993:49; Remmers, 1998:6). The World Wide Web environment can also support different perspectives, making use of the strengths of different media and presenting this in a powerful and appropriate form (Remmers, 1998:17). The choice of a suitable vessel is essential for the success

of an undertaking. It is therefore important to ensure that most probable users even users with “old” browsers should be able to access a web site (Bates, 1995:2; Le Page, 1999:31).

3.5.1 Barriers restricting the use of the Internet and the World Wide Web

There are a number of barriers preventing users from using the Internet and the World Wide Web optimally. These are:

- **Technical barriers** caused by:
 - old or antiquated hardware, including:
 - old modems;
 - a CPU incapable of supporting modern graphical web browsers at speeds fast enough to be practical for use in successful surfing (Maddux, 1998:24); and
 - limited bandwidth and large file sizes which limit the speed of downloading (Remmers, 1998:17).

- **Cultural barriers** caused by:
 - Internet and web paranoia, because of sensational media stories of pornography, violence, other inappropriate material, and spreading of harmful web sites and viruses (Information, 1998:1; Maddux, 1998:24).

- * **Administrative barriers** caused by:
 - lack of technological understanding;
 - failure to use opportunities and incentives to learn new technological skills (Information, 1998:1; Maddux, 1998:24).

These barriers should be taken into consideration when designing or developing a web site by allowing for different levels of use. Care should be taken to ensure that the information is readable on the most basic computers. It should be as complete as possible without necessarily needing any “cutting edge” technology.

3.5.2 Use of the World Wide Web as an information tool

It is predicted that the use of the World Wide Web as an information tool should increase up to 4 times over the coming years (Slabber, 1999:5). A recent survey of the increased use of World Wide Web indicates the following important factors:

Table 3.1 Factors promoting the use of the World Wide Web as an information tool

High quality content	75%
Ease of use	66%
Quick to download	58%
Updated frequently	54%
Details and summaries	54%
Coupons and incentives	14%
Favourite brands	13%
Cutting-edge technology	12%
Games	12%
Purchasing capabilities	11%
Customizable content	10%
Chat and bulletin boards	10%

(Internet demographics, 1999:2)

The survey indicates the following preferences for activities involving the World Wide Web.

Table 3.2 Activities considered easier to do online:

Conducting research	69%
Reading news	51%
Get product information	49%
Keeping abreast	28%

(Information, 1998:1-8; Internet demographics, 1999:2)

The survey also gives the following statistics relating to the used of the Internet:

Table 3.3 Internet demographics for 1999

Average age of users	38yrs
USA web users	56%
Non-USA web users	44%
Use the web 1-4 times a day	85%
Use browser more than 4 times a day	44%
Access the web via 33.6Kbps modem or slower	64%
Gather information for personal use	72%
Use web browser for work/research	51%
Europeans using web for work	79%
Americans using web for work	55%
Access Internet from home and pay for it themselves	70%
Use English as their first language	88%

(Information, 1998:6; Internet demographics, 1999:2)

The factors promoting web use, activities for which the World Wide Web is currently used and demographics of web use gives an indication of elements to be considered when creating a web site.

3.5.3 Usage of the World Wide Web by different groups

There are different kinds of web users. Each of these groups have unique requirements. These groups are:

3.5.3.1 *Web surfers*

For this group of web users the following have to be provided: Home pages aimed at surfers should be similar to a magazine cover, where the objective is to entice the casual user to enter and browse (Lynch & Horton, 1997:2). The links on this type of home page should lead inward towards the content or screens on the site.

3.5.3.2 *Novice and occasional users*

This group of web users require the following: Home pages or web-based documents aimed at this group of users, should have a clear structure and easy access to overviews, because novices can easily be intimidated by too much information and show a marked reluctance to delve deeper for information. Jakob Nielsen of Sun Microsystems as quoted by Lynch & Horton (1997:2) is of the opinion that less than 10% of web readers ever scroll beyond the top of web screens. Occasional users benefit from overviews and maps (Lynch & Horton, 1997:2).

3.5.3.3 *Expert and frequent users*

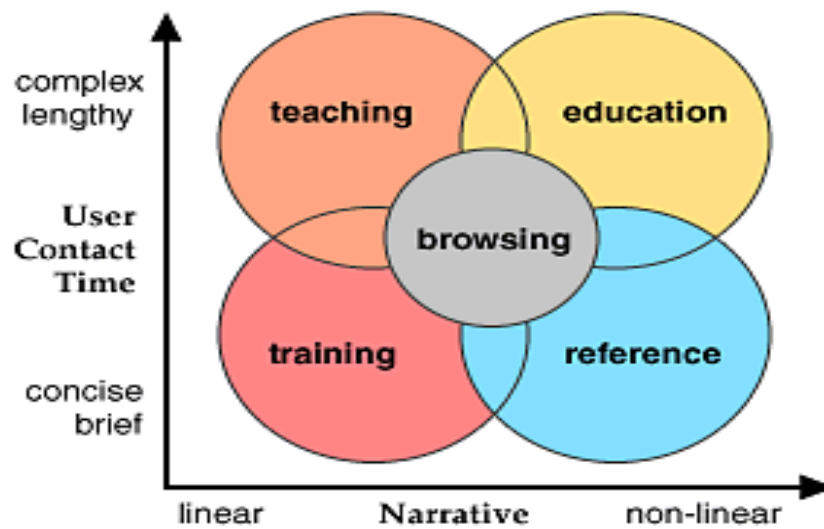
These users required information quickly and require detailed information without many frills (Lynch & Horton, 1997:3). These Internet users are interested in scientific and technical information (Information, 1998:3). They prefer summaries and need more detailed information than is available in print versions (Information, 1998:5).

3.5.4 Major categories of web use

The web is used for a large variety of purposes. The exact nature of the presentation of a final web site is governed by the parameters listed in 3.5.2. The graph below, shows the four major categories of web use influenced by two fundamental variables. The variables are:

- the linearity of the web site; and
- the length of contact time (Lynch & Horton, 1997:1).

Figure 3.1 The major categories of web use



Copyright Lynch & Horton, 1997. Yale University. <http://info.med.yale.edu/caim/manual/>

3.5.4.1 Using the web for training

When the web is used for training, the following characteristics become apparent (Lynch & Horton, 1997:1):

- It tends to be very linear in design.
- It presents few opportunities to deviate from the central flow of the presentation.
- It should not confuse users by offering many links away from the central message.
- These links should be restricted to "next" and "previous" .
- Paging functions guarantee that everyone sees the same presentation.
- Allows author to make more accurate predictions of user contact time.

- Contact time is usually less than one hour.
- Web sites may require a user log in.
- Web sites can include forms-based quiz questions in true/false or multiple-choice formats.
- User log information and scores are typically stored in a database linked to the web site.

3.5.4.2 *Web use for teaching*

The web can be an effective teaching aid. Characteristics of this application are as follows (Lynch & Horton, 1997:2):

- It is built around a strong central narrative, but typically offers more opportunities for students or users to pursue interesting digressions from main themes of the web site.
- Information presented is usually more sophisticated and in-depth than in training applications.
- Links can be a distraction that may prevent users from getting through the basic presentation.
- Links to other web-based resources beyond the local site may be grouped on a separate screen, away from the main body of the material.
- Users may want to print the material from the web and read it later. This can be facilitated by providing a "printing" version, which consolidating many separate screens into one long screen.

3.5.4.3 *Web use for education*

This application of web use is aimed at heuristic, self-directed learning. When used for education the following should be kept in mind (Lynch & Horton, 1997:2):

- The design should not be too restrictive and linear.
- The typical user is already highly educated.
- The design should be flexible, interactive, with nonlinear structures.
- The design should allow fast access to a wide range of topics, and is typically very dense with links to related material, within the local web site and beyond on the World Wide Web.
- Text-based lists of links are suitable for tables of contents and indexes, because they load fast and are dense with information.
- The user can be easily bored and needs the frequent stimulation of well-designed graphics and illustrations to stay involved with the material.
- Easy printing options are also a must for this audience.

3.5.4.4 *Web use for reference*

This application of web usage is useful if quick access to particular information also needs attention to the following (Lynch & Horton, 1997:2):

- The best-designed reference web sites should allow users to pop into the site quickly, find what they want, and easily print or download what they find.
- It typically has no "story" to tell, so the usage patterns are totally nonlinear.
- Content and menu structure should be carefully organized to:
 - support fast search and retrieval;
 - easy downloading of files; and

- convenient printing options.
- Graphics should be minimal to speed up download times.
- Search software may be of value, instead of relying exclusively on index-like lists of links.
- Contact time is typically brief, the shorter the better.

Use of the web for teaching and education engages the user for longer periods of time than when it is used for training and reference. Reference and education is much more effective when nonlinear programming is used. Browsing plays a role in all four categories of web use. Before using the web for a specific purpose, most users should start by browsing around or in the web site they intend using.

3.5.5 Suitable browsers for using the World Wide Web

Between 73-95% web users have *Netscape Navigator* and *Internet Explorer*, in all its versions. *Netscape Navigator* is used by $\pm 50\%$ and *Internet Explorer* by $\pm 23\%$ (Internet demographics, 1999:2; Le Page, 1999:31). Not all users have or want to have the latest versions of the software, but continue using *Internet Explorer 3* and *Netscape Navigator 3.0* (Le Page, 1999:31; Millheim & Harvey, 1998:54; Tognazzini, 1999:6) To accommodate the variety of browsers the following should be considered:

- It may be feasible to direct users to different screens for different browsers (Tognazzini, 1999:6).
- It may be important to check the various hardware platforms (*Windows* and *Macintosh* compatible) to ensure that all users can utilize available web sites (Millheim & Harvey, 1998:54).
- It may also be useful to limit the use of some components (motion video, digital audio) beyond standard HTML and GIF files (Millheim & Harvey, 1998:54).

3.5.6 Selection of a structure for the construction of a web site

The selection of a suitable structure, when designing a web site is very important. There are five kinds of structures from which a choice can be made. They are:

3.5.6.1 *Linear structure*

The linear structure in figure 3.1 shows a simple way of organising information in the linear or sequential presentation of data. It may be organised chronologically, from general to specific, from simple to complex or from abstract to concrete. It should be worked through from start to finish before continuing. The user has no choice and information is presented in small digested units. The user is not distracted by other information on external World Wide Web screens. It can be regarded as passive use of information (Lynch & Horton, 1997:1; Remmers, 1998:19-20, 23; Ross, 1993:13).

Figure 3.2 Linear structure

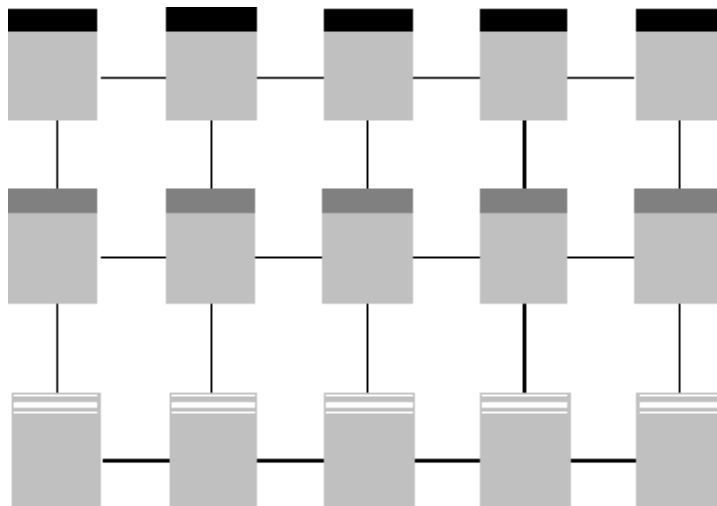


(Remmers, 1998:19)

3.5.6.2 *Grid structure*

The grid structure (figure 3.2) is made up of individual units, which share a uniform structure of topics. The user should have a basic understanding of the topic and the relevancy and interrelationships between categories of information. It is used for users with a background of the subject. The user has choices of where to go (Lynch & Horton, 1997:1; Remmers, 1998:20, 23; Ross, 1993:13).

Figure 3.3 Grid structure

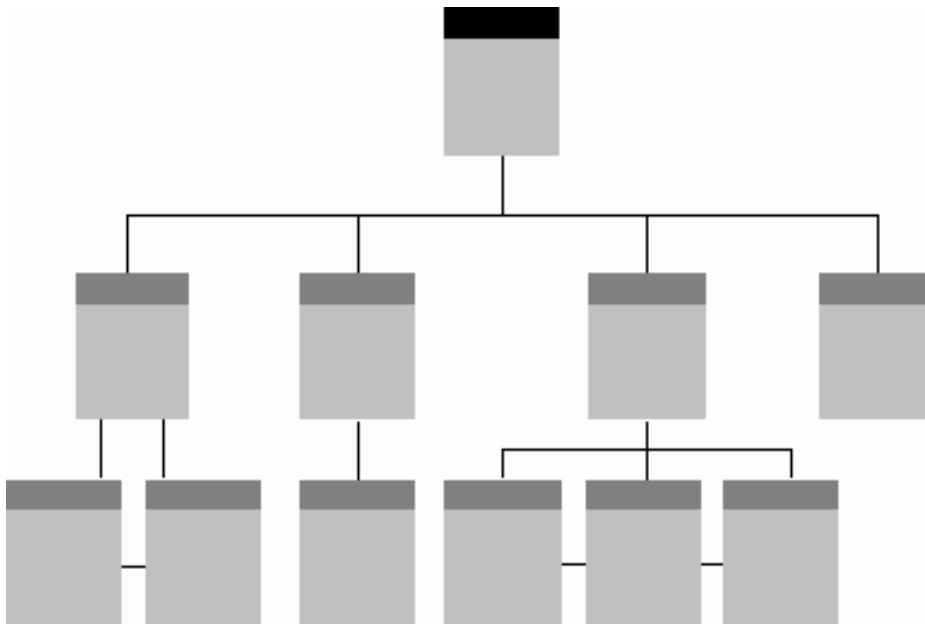


(Remmers, 1998:23)

3.5.6.3 Hierarchical structure

The hierarchical structure in figure 3.3 is divided into specific concepts, which are then divided into individual objects. The user navigates up and down to reach the various World Wide Web screens. It is used for complex information and suited for World Wide Web sites with a home page with offshoots to specific information (table of contents of books). The user cannot go directly from one subtopic in a specific category to another. He should return to the home or main page and go from there to another category. This can be overcome with the use of links to the home or main page on all screens and categories to combine a hierarchical structure with a web structure (Lynch & Horton, 1997:2; Remmers, 1998:21, 23; Ross, 1993:13).

Figure 3.4 Hierarchical structure

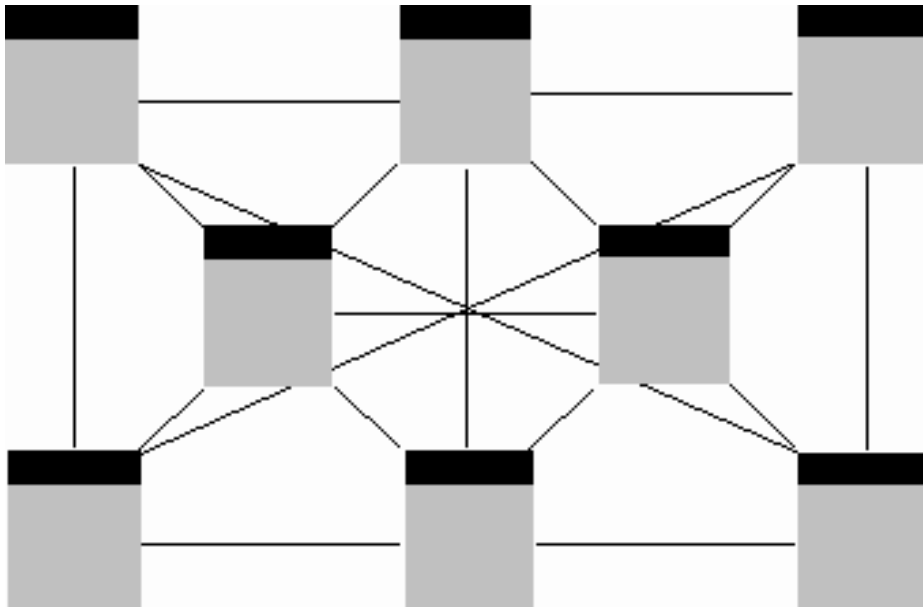


(Remmers, 1998:23)

3.5.6.4 Web structure

With the web structure (figure 3.4) the user can go from one screen to the next related screen. It mimics associative thought and the user can follow his interest and train of thought. The user is stimulated into thinking comparatively, but can get lost or distracted by less important information (Lynch & Horton, 1997:2-3; Remmers, 1998:21, 23; Ross, 1993:13).

Figure 3.5 Web structure

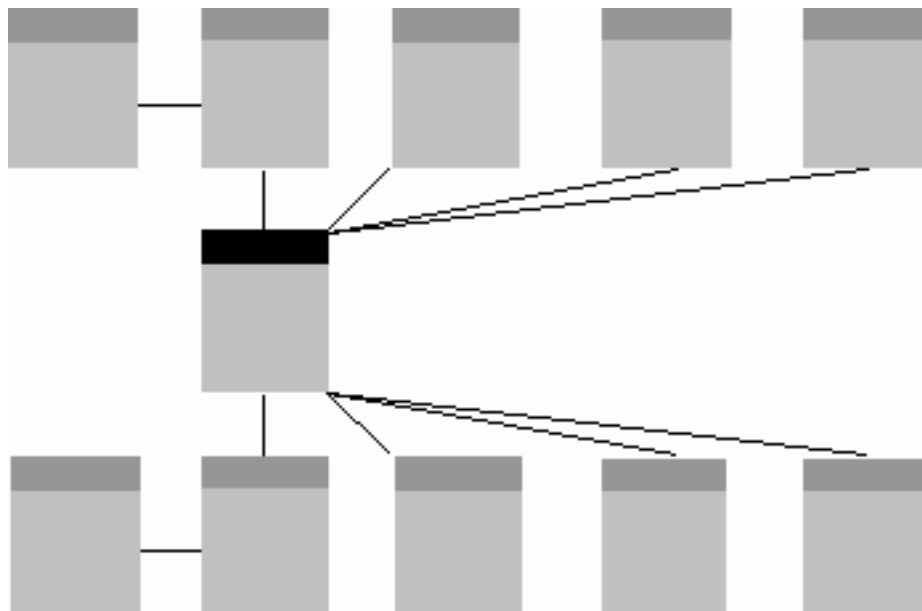


(Remmers, 1998:23)

3.5.6.5 *Empirical structure*

The empirical structure in figure 3.5 starts from the home page and there are links back to the home page on all the screens in the site. The user can enter through the home page or through information contained in other screens. Some information can be in a linear format (Remmers, 1998:21-22). It can be used successfully by both novices and experts.

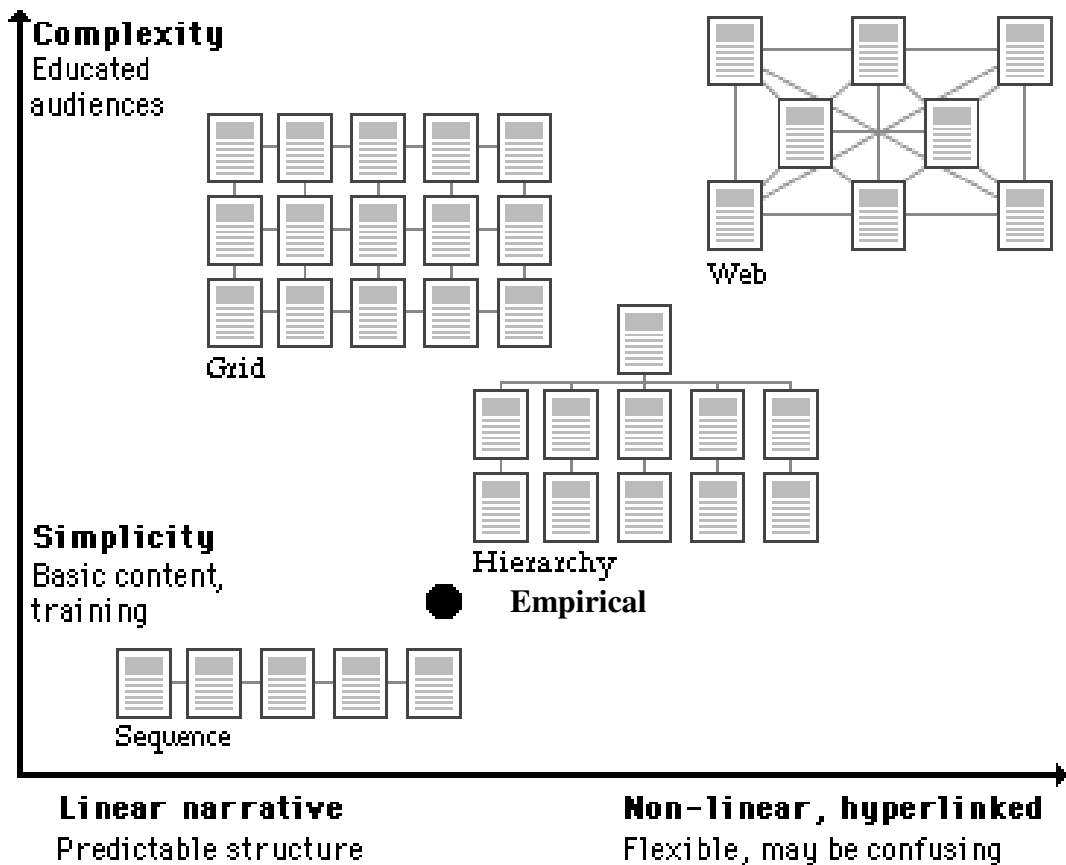
Figure 3.6 Empirical structure



(Remmers, 1998:23)

The structures are represented in the following comparative diagram:

Figure 3.7 A summary of all the basic information structures



(Remmers, 1998:23; Lynch & Horton, 1997:3)

According to Remmers (1998:22) The empirical structure must be placed just to the left and below the hierarchical structure.

A linear structure is especially suitable where the content is not too complex. The users are novices and the information is of an instructional nature. The grid structure can only be used by experts. The hierarchical structure is very complicated and can only be used where the user has some knowledge of the subject. A web site is fully

interactive and accommodates both expert and novice users. The information should be interrelated. The user should know about these relationships to be able to navigate successfully. The empirical structure represents a situation familiar to users and it allows for a less abstract view of the content.

3.5.7 Hardware requirements for accessing a web site

An MPC Standard (Multimedia Personal Computer) applies to all IBM compatible computers (Bass, 1997:11). The first MPC standard was quickly outdated as more elaborate web sites were developed, and the MPC2 standard was developed. The MPC and MPC2 standards are minimal level standards (Bass, 1997:11). There is now an even better standard, namely an MPC3 set of specifications as can be seen in Table 3.4 (Bass, 1997:11; Vaughan, 1998:56-59).

Table 3.4 MPC standards for multimedia computers

The MPC Standard:
CPU: 16 MHz 386SX Hard Disk: 30 Mb RAM: 2 Mb CD-ROM: single speed (150 kilobytes per/second) Video Card: VGA 640x480 with 64 colours) Floppy Disk: 3 ½ inch Sound Card: 8-bit with 8 note synthesizer
The MPC2 Standard:
CPU: 25 MHz 486SX Hard Disk: 160 Mb RAM: 4 Mb CD-ROM: double speed (300 kilobytes per/second) Video Card: 640x480 with 65,536 colours Floppy Disk: 3 ½ inch Sound Card: 16-bit with 8-note synthesizer; MIDI playback.
"Even Better" / MPC3
CPU: 50 MHz 486DX or better Hard Disk: 340 Mb RAM: 8 Mb CD-ROM: triple speed (450 kilobytes per/second) Video Card: 1024x768 with 65,536 colours Floppy Disk: 3 ½ inch Sound Card: 16-bit with 8-note synthesizer; MIDI playback

(Bass, 1997:12; Vaughan, 1998:56-59).

All multimedia web sites require a mouse, which should be part of any basic multimedia package (Bass, 1997:12). Many users still feel more comfortable using a keyboard, and both mouse and keyboard should be activated for use as an interaction device (Schwier & Misanchuk, 1993, 117, 123, 125)

Although the basic MPC standard requires an 8-bit sound card, it is not absolutely essential to run multimedia web sites (Table 3.4). *Windows 3.1* is equipped with a sound driver that can project basic sounds with minimal range (Bass, 1997:12; Vaughan, 1998:56-59). This should give the user limited sound during the use of the web site (Le Page, 1999:31).

The inclusion of video should result in the inability of some users to view it (Le Page, 1999:31). Not all users have machines equipped with the required technology (Le Page, 1999:31). The user can or will often not download huge software or “plug-in” packages, which are freely available on the Internet. This can be due to time, space and telephone cost constraints (Le Page, 1999:31). Care should be taken during the design to ensure that the user with non-video abilities should still be able to use the web site (Le Page, 1999:31).

3.5.8 The use of CD-ROMs

An alternative way of distributing information is by CD-ROM. It can hold large amounts of data (up to 660MB) and can be produced relatively quickly and inexpensively. A CD-ROM can also hold a variety of information such as video and sound. It is a relatively stable storage medium. It is in a standardized format which can be utilised by using most available CD players, which are connected to or part of a computer system. CD-ROMs allow for random access to information (Lappas & Kekkeris, 1996:1-3; Schwier & Misanchuk, 1993:105-107).

Users often cannot afford new equipment or upgrade to newer hardware and software. It is essential therefore to ensure that the final product, whether a World Wide Web site or document, is accessible by most if not all members of the target groups. Existing barriers and availability of browsers, as well as the reasons for using the World Wide Web should be considered.

3.6 The use of Hypertext Markup Language (HTML)

The World Wide Web is a network of information sources. The web is dependant on three mechanisms to make resources available to the widest possible audience:

- a uniform naming scheme for locating resources (URI - Universal Resource Indicator);
- protocols, for access to named resources over the web (eg HTTP); and
- hypertext for easy navigation among resources (e.g. HTML) (Introduction, 1999:1-2; Murrell, 1999:1).

Hypertext is the way in which computer databases or documents are organized to facilitate non sequential retrieval of information. Related information is connected by predefined or user-created links, which allow the user to follow associative trails through the database. The linked data may be in a text, graphic, or audio format, to allow multimedia presentations (Hypertext, 1999:1).

HTML is the publishing language used on the web and is the coding used to create documents. HTML enables the user to:

- publish online documents with text, tables, lists and photos;
- retrieve online information via hypertext links at the click of a button;
- design forms; and

- include spreadsheets, video-clips, sound clips and other animations (Basic HTML, 1999:1)

Web sites written using HTML can be viewed on various browsers (*Netscape Navigator*, and *Internet Explorer*). It can be viewed in any text editor or word processing packages, if it is saved in a text or ASCII (American Standards Code for Information Interchange) format. HTML 4.0 is a Standardized General Markup Language (SGML) application, adhering to International Standard ISO 8879 - Standardized General Markup Language (Beginner's, 1997:2; HTML 4.0, 1998:1-5; Hypertext Markup, 1997:1; Murrell, 1999:1; Raggett, et al. 1998:1; Vaughan, 1998:199-200; 498).

3.7 HTML editors

Various HTML editors enable easier development of documents suitable for the World Wide Web, by providing wizards and assistants as an aid in developing web screens (Basic HTML, 1999:1). The basic editors focus on browser compatibility and established web standards (Basic HTML, 1999:1). The following kinds of editors can be used:

- Basic editors
 - *HotDog Web Editor*;
 - *W3e Editor HTML Plus Special Edition*;
 - *Frontpage*;
 - *HTMLedPRO*;
 - *Hypertext Master*;
 - *Web Wizard*;
 - *AOLPress*; and

- *Sausage software.*
- WYSIWYG (what you see is what you get) editors :
 - *SoftQuad HoTMetal* ; and
 - *NaviPress.*
- Advanced HTML Editors
 - *Dreamweaver;*
 - *Amaya;*
 - *Multimedia Toolbook;*
 - *Quest;*
 - *Netscape composer;* and
 - *BEdit.* (Beginner's, 1997:2; Advanced HTML editors, 1999:1; Basic HTML, 1999:1-4; Brent's, 1999:1-5; Free HTML, 1999:1-2; HTML 1999:1-2; HTML Editors, 1999:1; Murrell, 1999:1; Raggett, 1998:1; Vaughan, 1998:199-200)

3.8 The use of *Dreamweaver* as a web-authoring tool

Various tools are available for use in developing multimedia web sites. Advantages and disadvantages of each should be considered to ensure that the chosen authoring tool fulfills all the requirements of the user of the web site and the aims the author of the web site wants to achieve. The capabilities of the hardware should be taken into consideration before a final decision is made. It may be advisable to use current web sites with added input from specific web sites for specific units. This should ensure continuity in the programming and save time by not learning and adjusting to new web sites. Many of the web site packages available from *Microsoft*, *Macromedia* and *Corel*, offer the user and author some freedom in working with word processing and graphics editing. Saving these in various formats (SGML or HTML), and incorporating

sound and video by using utilities aimed at facilitating this, should result in a multimedia programme (Vaughan, 1998:16).

3.8.1 Attributes of *Dreamweaver*

For the purposes of this study the web-authoring tool (advanced HTML editor) *Dreamweaver*, was chosen, rather than using fragmented elements and putting it together. *Dreamweaver* allows the efficient design and production of screens, as well as comprehensive site management. It also allows for visual authoring for dynamic publishing, and *Roundtrip XML*[™]. *Dreamweaver* is an extensible web development platform, which is designed to work with custom and commercial e-commerce, database, dynamic publishing and rich media technologies (Dreamweaver information, 1999:1).

3.8.1.1 Visual editor

Dreamweaver is a professional visual editor for the creation and maintenance of web screens. It is a simple process to create cross-platform, cross-browser HTML documents, which can be imported into *Dreamweaver* without reformatting the code.

3.8.1.2 Dynamic HTML and Roundtrip HTML[™]

Dreamweaver uses *Dynamic HTML* to produce animated layers and behaviours without the need for the author to write any code. *Dreamweaver* revolutionized web authoring with *Roundtrip HTML*[™], and is now extending this functionality to support *Roundtrip XML*. *Dreamweaver* now parses and respects a user's XML code. Since XML standards are still evolving, the support for XML in *Dreamweaver* is extensible. Customers can define XML tags using the new tag database, add new XML objects to

the *Dreamweaver* object palette, and create property inspectors for editing XML. *Dream Templates*™ also supports XML with *Roundtrip*, importing and exporting between templates and XML.

3.8.1.3 *Checking a web site*

Potential problems can be eliminated by checking web sites on all popular platforms and browsers. *Dreamweaver* has many new features which help authors to build cross-browser web screens quickly and efficiently. *Dreamweaver* allows precise positioning of elements on a HTML screen, with one-step conversion of layers to tables for compatibility with 3.0 browsers and lower.

3.8.1.4 *Flash™ and Shockwave™*

Dreamweaver can also incorporate live *Macromedia Flash*™ and *Macromedia Shockwave*™ playback in the web site (Dreamweaver, 1998:9; Dreamweaver information, 1999:1). Authors can insert an image to use as a guide while designing screens, enabling production artists to go from a *Fireworks* or *Photoshop* composition, to a finished HTML screen in record time.

Advanced table editing features in *Dreamweaver* give authors more control and formatting options than any other web authoring tool. Web authors can now also view *Macromedia Flash*™, *Macromedia Shockwave*™, and other plug-in content live, within the *Dreamweaver* authoring environment, without having to preview in a browser.

3.8.1.5 *Dynamic web publishing*

Dreamweaver is the first visual tool for dynamic web publishing to deliver "What You See Is What You Serve" which gives web authors a visual rendering of server-side content within a web authoring environment (Dreamweaver information, 1999:1). Currently, web authors have to post a site to a server and preview it in a browser in order to see server-side content when creating or updating dynamic web sites. Because of its open, extensible architecture, *Dreamweaver* works easily with leading e-commerce and dynamic publishing solutions (Dreamweaver information, 1999:1).

3.8.1.6 *Dream Templates*[™]

With *Dreamweaver* developers can manage design and content across an entire site with the most powerful combination of site management features on the market. Web authors can use new *Dream Templates*[™], to specify which sections of a site can be edited by content contributors, while maintaining design consistency across a site. *Dream Templates*[™] enables a fast turnaround on updates and changes, facilitating workflow in collaborative production environments.

3.8.1.7 *Site management*

Dreamweaver is the only tool which features site-wide search and can replace text, HTML source, and attributes within HTML tags. This enables users to manage global changes easily. A new site map and automated link and file management simplify the creation and maintenance of web sites (Dreamweaver information, 1999:1).

The choice of *Dreamweaver* as an authoring programme, was also influenced by the availability of the programme at the time of developing this web site, but it has proved to be an excellent authoring tool for producing a web site.

3.9 The use of an Electronic Performance Support System (EPSS) programme

Multimedia authoring tools facilitate important educational and cognitive processes, including cooperative learning, group problem solving, critical thinking, reflection, analysis, enquiry, process writing, and public speaking. These tools are inherently metacognitive. They help students think about thinking. (De Jong & Sarti, 1994:1; Fraundorf, 1999:1; Multimedia, 1999:1; Sherry & Wilson, 1996:4; Vaughan, 1994:4)

Delivering such a system by computer, is known as an Electronic Performance Support System (EPSS) (Cronjé & Barras Baker, 1998:1; Scales, 1998:2). The advent of EPSS changed the original computer assisted training approach of “fill’em up with knowledge and skills and put’em to work”, to the provision of an appropriate suite of integrated supports within the context of performing real-work tasks (Malcolm, 1998:1; Sherry & Wilson, 1996:3).

3.9.1 What is EPSS?

Gery (1991:34) defines an electronic performance support system as follows: "An integrated electronic environment that is available to and easily accessible by each employee and is structured to provide immediate, individualized on-line access to the full range of information, software, guidance, advice and assistance, data, images, tools, and assessment and monitoring systems, to permit job performance with minimal support and intervention by others". This definition reflects the initial focus of EPSS, which is enabling rapid performance by the user (Gery, 1995:70). As people’s reference changed from traditional methods of training and documentation to requirements for generating and maintaining performance within the daily work situation, the definition became too narrow and not completely usable (Gery, 1995:70).

Collis & Verwijs (1995b:12) elaborate further on this definition, saying: “EPSS is an electronic system, through which, via a common front-end, the user can interact with the system to obtain various types of local or distributed help and resources for individual or group orientated activities related to learning problem-orientated thinking, and collaboration.”

The definition is further broadened by Raybould by the inclusion of the corporate environment (Raybould, 1995a:10-11; Raybould, 1995b:66): “An EPSS is the electronic infrastructure that captures, stores and distributes individual and corporate knowledge assets throughout an organization, to enable individuals to achieve required levels of performance in the fastest possible time, rather than on enabling performance in the fastest possible time and with a minimum of support from other people”.

A definition by Miller, 1996:1, expands the use of an EPSS with a results-based definition: “An electronic performance support system is any computer software web site or component that improves employee performance by either:

- **process simplification** by reducing the complexity or number of steps required to perform a task;
- providing the **performance information** an employee needs to perform a task; or
- providing a **decision support system** that enables an employee to identify the action that is appropriate for a particular set of conditions”.

It is evident from these definitions that the primary goal of an EPSS is to enable users to achieve a required level of performance which should result in higher productivity and quality of work done. Skills are learned by doing and not by being taught (Remmers, 1998:8; Miller, 1996:1-3; Sherry & Wilson, 1996:3). It is also envisaged

by some that EPSS should in future be utilised by groups in their work situation and should be dynamically updated by users (Malcolm, 1998:1).

3.9.2 Types of Performance Support Within Computer-Mediated Work Environments

The changes referred to above are reflected in the way in which EPSS systems are described and characterized. Computer mediated work environments are the rule rather than the exception, and their use increase daily (Gery, 1995a:70) There are three fundamental types of performance support within computer-mediated work environments, each with their own characteristics. According to Cronjé & Barras Baker (1998:5) and Gery (1995:70) they are:

- ***Intrinsic support***, which is performance support that is inherent to the system itself. This support is integrated into the software and the user does not perceive it as software. It simply feels if they are just *doing their work* (Gery, 1995:70; Marion, 1999a:3; Miller, 1996:3). The following attributes are examples of intrinsic performance support according to Gery (1995:70) and Miller (1996:4):
 - establishes and maintain a work context;
 - focuses on the task performance;
 - aids goal establishment;
 - structures work process and progression through tasks and logic;
 - institutionalizes business strategy and best approach;
 - contains embedded knowledge in the interface, support resources, and system logic;
 - uses metaphors, language, and direct manipulation of variables to capitalize on prior learning and physical reality;
 - reflects natural work situations;
 - provides alternative views of the application interface and resources;
 - observes and advises;
 - shows evidence of work progression;
 - provides contextual feedback;

- provides support resources without breaking the task context;
 - provides layers to accommodate performer diversity;
 - provides access to underlying logic;
 - automates tasks;
 - provides alternative knowledge search and navigation mechanisms;
 - it allows customization;
 - provides obvious options, next steps, and resources; and
 - employs consistent use of visual conventions, language, visual positioning, navigation, and other system behaviour.
- ***Extrinsic support***, which is performance support that is *integrated* with the system, but is not the primary work space (Gery, 1995:70; Miller, 1996:3; Marion, 1999a:3). Extrinsic support is not inherent to the applications and users can continue without them. It can be turned on or off by the user (Gery, 1995:70; Marion, 1999a:3; Miller, 1996:3). The following are some of the attributes of extrinsic support structures according to Cronjé (1995:4); Gery (1991:40-43); Gery (1995:70); Leighton (1999:2); Marion (1999a:5-7); Miller (1996:3); Scales (1998:5); and Sleight (1993a:1):
 - It includes cue cards for task guidance and sequence content by performer choice or underlying logic.
 - It gives explanations or demonstrations for presentation sequence and can be interactive or not.
 - It provides wizards, assistants or helpers for options or choices, assists user through a tasks, summarizes choices or conditions, produce output or execute tasks, and transform data.
 - It coaches or guides the user by a structured interactive walk-through of system related procedural tasks present.

- It gives a searchable reference for content or knowledge database on concepts, products, processes, equipment, facts, principles and is organized for flexible search, retrieval and navigation.
 - It includes checklists which list items or task completion criteria.
 - It includes tips which contain hints, tips and alternatives.
 - It includes practice activities with structured practice and “let me try” activities.
- **External Support**, which is support for performance and learning that is *external* to and not integrated with the computer-mediated work space (Gery, 1995:70; Gery 1995b:3; Marion, 1999a:3; Miller, 1996:3).

3.9.3 Attributes and benefits of EPSS

The aim of an EPSS web site is not to produce a single sequence or structure which is linear, but to provide structures that are meaningful to users, allowing them access to information required (Leighton, 1999:1, 3; Marion, 1999a:3 ; Miller, 1996:3; Remmers, 1998:8; Sleight, 1993a:2; Witt & Wager, 1994:22). These attributes are:

3.9.3.1 Computer-based support

It is a computer-based interactive guidance and information support facility which is integrated into the working environment and accessed through a graphical user interface (GUI)(Barker & Banerji, 1995:4; Leighton, 1999:2; Najjar, 1996:130; Scales, 1998 2; Sleight, 1993a:1).

3.9.3.2 Access to information and tools when needed to perform a task

It allows users access to just-in-time information (JIT) at the moment of need or when the task should be performed (Barker & Banerji, 1995:4; Cronjé & Barras Baker, 1998:1; EPSS Infosite, 1999:1; Gery, 1991:34; Gery, 1995:70; Hawkins, et al. 1998:17; Leighton, 1999:1, 3; Marion, 1999a:1; Miller, 1996:2; Remmers, 1998:9; Sherry & Wilson, 1996:3; Scales, 1998:2; Sleight, 1993a:1, 3; Witt & Wager, 1994:22). It improves quality of performance (Miller, 1996:2; Raybould, 1995b,66; Sherry & Wilson, 1996:8).

3.9.3.3 Used on the job, in simulations, or other practice

It enables “day-one-performance”. The user should be productive on very first day he starts using a system (Barker & Banerji, 1995:5; Leighton, 1999:2; Miller, 1996:2; Remmers, 1998:10; Scales, 1998:2; Sleight, 1993b:2).

3.9.3.4 Controlled by the user

It focuses on the user, which is the human dimension (Barker & Banerji, 1995:5; Collis & Verwijs, 1995b:13; Remmers, 1998:11). It gives control and help to the user (Hawkins et al., 1998:17; Leighton, 1999:3; Remmers, 1998:11; Sleight, 1993b:2).

3.9.3.5 Reduces the need for prior training in order to accomplish a task

It provides training with a minimum of external support (Gery, 1995:70; Miller, 1996:1; Remmers, 1998:11; Sherry & Wilson, 1996:3).

3.9.3.6 *Easily updated*

It provides up-to-date information (Remmers, 1998:14-15; Sleight, 1993a:2). It ensures increased retention and responsiveness to business information and knowledge (Malcolm, 1998:2; Miller, 1996:2; Raybould, 1995b,66).

3.9.3.7 *Fast access to specific, task-related information on demand*

It allows fast access to discrete specific information (Miller, 1996:2; Remmers, 1998:9; Scales, 1998:2; Sleight, 1993a:2; Sleight, 1993b:1-2; Sherry & Wilson, 1996:8), such as:

- data (textual, numerical, visual or audio);
- instruction (visual presentation, lists, simulating);
- advice (may be an expert system); and
- tools (spreadsheets, databases, statistical analysis tools).

It provides alternate forms of knowledge/information representation, for example video, audio, text, images, data (Sleight, 1993a:1; Sleight, 1993b:1).

3.9.3.8 *Irrelevant information is excluded*

It reduces the complexity or number of steps required to perform a task (EPSS Infosite, 1999:1; Hawkins et al., 1998:17; Leighton, 1999:3; Marion, 1999a:1; Remmers, 1998:9; Scales, 1998:5; Sleight, 1993a:2).

3.9.3.9 *Allows for different levels of user knowledge*

It allows for different levels of expertise of users, ranging from novices to experts (Remmers, 1998:11, 13; Sleight, 1993a:1-3; Sleight, 1993b:2; Witt & Wager,

1994:21). It supports a higher level of performance today and builds infrastructure for work to be done in the future (Leighton, 1999:2; Remmers, 1998:11, 13). It provides assessment systems either for self evaluation or employee assessment for certification purposes. It enables monitoring, assessment and feedback systems which observe user performance (Cronjé, 1995:4; Gery, 1991:40-43; Leighton, 1999:2; Marion, 1999a:5-7; Remmers, 1998:11, 13; Scales, 1998:5; Sleight, 1993a:1).

3.9.3.10 *Allows for different learning styles*

Support should be matched to the competency of each learner and allow for different learning styles (Remmers, 1998:11; Sleight, 1993a:2; Witt & Wager, 1994:22). The focus of EPSS is not the subordinate intellectual skills necessary to perform a job, but rather the steps and substeps performed and information needed by different levels of workers at each step (Witt & Wager, 1994:21).

3.9.3.11 *Integrates information, advice, and instruction*

It provides a decision support system that enables an employee to identify the action that is appropriate for a particular set of conditions (Collis & Verwijs, 1995b:13; EPSS Infosite, 1999:1; Hawkins et al., 1998:17; Leighton, 1999:3; Marion, 1999a:1; Remmers, 1998:11-12; Scales, 1998:5; Sherry & Wilson, 1996:6; Sleight, 1993a:2). It gives immediate feedback (Barker & Banerji, 1995:5; Hawkins et al., 1998:17; Leighton, 1999:3; Sleight, 1993b:1).

3.9.3.12 *Can be linear or modular*

It provides interactive training sequences which, unlike traditional Computer-based Teaching, are granular and task-specific, although they can be strung together to form

a longer training module (Cronjé, 1995:4; Remmers, 1998:13; Marion, 1999a:5-7; Gery, 1991:40-43; Leighton, 1999:2; Scales, 1998:5; Sleight, 1993a:1).

3.9.3.13 *Is software driven*

It includes all the software needed to support users (Raybould, 1995a,11). It integrates knowledge assets into the interface of the software tools as opposed to separating them as add-on components (Raybould, 1995a,11; Raybould, 1995b,66). It makes sure that the system chosen is compatible with other existing equipment (Witt & Wager, 1994:23). It provides dedicated application software, such as project schedulers, electronic mail, and electronic diaries, (Cronjé, 1995:4; Gery, 1991:40-43; Leighton, 1999:2; Marion, 1999a:5-7; Scales, 1998:5; Sleight, 1993a:1).

3.9.4 The development of an EPSS system

EPSS is not an absolute system, but different systems contain different components or characteristics. It is a range of strategies and solutions using computer software to improve employee performance (Miller, 1996:2, 5; Sleight 1993a:3). EPSS offers:

- an integrated mechanism for problem solving;
- an attractive way of supporting human activity; and
- a natural way to learn where training is embedded within the task domain (Barker & Banerji, 1995:11; Witt & Wager, 1994:21)

An EPSS system should be flexible and appropriate for people with different needs (Remmers, 1998:12). Information should be focussed on the working and thinking pattern of different users and should be organized in ways related to individual work practices, rather than predetermined instructional routes and sequences (Remmers, 1998:13). It is important to let user needs drive the way in which information is located and used in an EPSS (Remmers, 1998:13).

The development of an EPSS system should be done with great care (Scales, 1998:6). Before a final product is put on the market, it should be tried, adapted and tested again and again to ensure compliance with the initial aim of training, informing and educating the user of such a web site (Scales, 1998:6).

3.9.4.1 Design Goals of EPSS

The ideal situation would be where as much as 80% of the required performance support of an EPSS is integrated as intrinsic support with about 10% each in the extrinsic and external categories (Gery, 1995:70). Advantages are:

- decreased costs; and
- establishment of easily maintainable environments (Gery, 1995:70).

3.9.4.2 Specification for user interface when using EPSS

The development of specifications for user interface is done during the strategy phase. These specifications must document the following:

- the nature of instruction;
- how much interaction should take place;
- what learning activities should occur;
- which outcomes which cannot be prespecified, but should emerge throughout the design and result in:
 - altering initial performance objectives; and
 - expanding goals;
- the provision of an intuitive interface
- the provision of an interface with a high level of user control;
- the navigation throughout the system should be obvious and easily understood by the user;

- the provision of access only to the information needed for a specific job or task;
- the selection of media to be included in an EPSS system evaluating:
 - media attributes;
 - costs; and
 - memory required for the integration of the media into the web site (Remmers, 1998:14; Witt & Wager, 1994:20-22).

These specifications are usually presented as:

- a detailed paper-based storyboard based on initial analysis and goals of the project, or
- an electronic mock-up with a detailed set of system specifications (Witt & Wager, 1994:22).

3.9.4.3 Evaluation of an EPSS

The evaluation of an EPSS prototype should take place throughout the development and revision stages (Witt & Wager, 1994:23). During this evaluation, it is necessary to use the users of the web site, ranging from novices to experts, to ensure that the requirements of the web site are met. It is also important to make the fact clear that the web site and not the user's performance is evaluated (Witt & Wager, 1994:23). It is important to ensure that the correct questions are asked as well as careful observations made (Witt & Wager, 1994:23).

Table 3.5 Questions which can be asked when evaluating an EPSS according to Collis & Verwijs (1995a:24); Collis & Verwijs (1995b:12-14); Vaughan (1994:24); Vaughan (1998:13); and Witt & Wager (1994:23).

General questions	<ul style="list-style-type: none"> • What they like or dislike; • How well is the information represent how the job should be done; • Whether they know where to go next; and • Which additional things they would like in the system.
Is the product useful	<ul style="list-style-type: none"> • Does it fit in with the personal needs of the users • Does it add value to the content of the product produces by them
Is the product usable	<ul style="list-style-type: none"> • Is the user interface easy to use • Is the product/web site easy to use • Is it easy to recover from user errors • Does the product make work easier • Does it fit in with work procedures • Does it fit in with the work environment • Does the user have the time needed to use it and • Does it save time

When the results of this evaluation become available, changes can be made.

- **Testing**

The products can be tested in different ways:

- **Rapid prototyping**, which is the process of quickly building and evaluating mock-up's allowing the developer to demonstrate possibilities of the EPSS web site quickly. The purpose of rapid prototyping is to allow for early feedback, and to change the web site in response to user requirements or needs. It can also ensure that the system support the user and lessen time spent on front-end analysis.
- **Limited field testing with end users.**
- **Formative evaluation** on how to improve the design to ensure that usage is likely. The outcome of the formative evaluation is a document reporting on changes that have to be made to ensure that all issues are addressed.
- **Continuous evaluation** to ensure that any areas lacking information or action are addressed by going back to the previous step.
- **Evaluation throughout the life-cycle** of the product, focussed on eventual user acceptance (Collis & Verwijs, 1995a:24; Vaughan, 1994:24; Vaughan, 1998:13-16; Witt & Wager, 1994:20, 23).

3.9.4.5 **The costs associated with using EPSS**

Using EPSS is expensive, because costs include the following:

- those incurred during development:
 - for rapid prototyping;
 - for testing; and
 - for software infrastructure (Hawkins et al., 1998:18; Raybould, 1995b:67).

Advantages of EPSS which offset high costs associated with development are:

- increased productivity;
- reduction of lost opportunity costs;
- reduction of support costs;
- reduction of training event costs;
- support for work by multiple departments;
- less time spent on developing or structuring of courses; and
- fewer courses used and man-hours missed (Raybould, 1995b:67-68).

3.9.5 Other computer-based instruction methods

Apart from EPSS other methods of instruction can also be used for training. The advent of computer-based interaction, forces authors to organize and structure learning materials better (Najjar, 1996:131).

3.9.5.1 Computer-Based Training (CBT)

Computer-Based Training, is a method for delivering a training course using computer-mediated delivery. It is typically developed using the Instructional Systems Design (ISD) process, combined with specific skills for delivering the content using a computer (Flouris, 1989:14-20; Gery, 1991:51; Malcolm, 1992:1-3; Raybould, 1995b:13; Remmers, 1998:9; Sleight, 1993b:4).

Computer-Based Training is used for interactive self-paced training, where information is presented in a coherent whole or module. It is not designed to allow quick access to specific task-orientated details (Cronjé & Barras Baker, 1998:2; Gery, 1991:51; Malcolm, 1992:2; Sleight, 1993b:5). Computer-Based Training supplies prepackaged information in a predetermined way, whilst an EPSS makes specific

information required for a specific task available on demand (Cronjé & Barras Baker, 1998:5). The inclusion of hypermedia and links to other software may lead to a resemblance of part of an EPSS, namely the tutorial, but not a complete EPSS (Gery, 1991:35, 51, 248; Malcolm, 1992:2; Sleight, 1993b:5).

3.9.5.2 *Electronic databases, information systems design or information engineering*

This encompasses the organization of information with the aid of hypertext tools to support on-line documentation and databases. Electronic databases can also be extended to form an EPSS, but the user interface (prior training, fast access, different access levels, etcetera) will be difficult to incorporate into something that is huge, cumbersome and rigidly structured (Sleight, 1993b: 4-5). The content can be available in the following structural forms:

Table 3.6 Structural forms of content for electronic database according to Gery (1991:39-41)

text	visual	audio
<ul style="list-style-type: none"> • procedures • policies • concepts • explanations • specifications • glossaries • commands 	<ul style="list-style-type: none"> • pictures • schematics • diagrams • graphics • maps • video 	<ul style="list-style-type: none"> • sounds • music

3.9.5.3 *On-line assistance or help*

This is a method of making expertise of various subject matter experts available through an interactive computer-based synchronous (realtime) or asynchronous system (Gery, 1991:49). It can be user or system initiated, inquiry based, or intelligent (Gery, 1991:43). It usually supports only software related tasks and is accessed through structured menus. It does not accept user input data except as menu choices (Gery, 1991:49).

On-line help is the nearest to EPSS, but it only provides information and not the necessary tools for each task (Sleight, 1993b:5). It could be extended to include the necessary tools, but its main function will still be an on-line help system and not an EPSS (Cronjé & Barras Baker, 1998:4; Gery, 1991:49; Sleight, 1993b:5).

3.9.5.4 **Comparison between computer-based instruction methods and EPSS**

A comparison of these methods with EPSS will indicate the advantages disadvantages and shortcomings of these methods compared with EPSS.

Table 3.7 Comparison between various instruction methods (compiled from Cronjé & Barras Baker, 1998:4-5; Flouris, 1989:14-20; Gery, 1991:49-51; Malcolm, 1992:1-3; Remmers 1998:9; Sleight, 1993b:4-5).

	Computer-Based Training	Electronic Database	Online Help	EPSS
Computer-based	✓	✓	✓	✓
Access to information and tools when needed to perform a task	X	✓	✓	✓
Used on the job, in simulations, or other practice	✓	✓	✓	✓
Controlled by the worker	X	✓	✓	✓
Reduce the need for prior training in order to accomplish the task	X		✓	✓
Easily updated	X	✓	✓	✓
Fast access to specific, task-related information on demand	X	X	✓	✓
Irrelevant information excluded	X	X	✓	✓
Allow for different levels of user knowledge	✓	X	✓	✓
Allow for different learning styles	✓	X	X	✓
Integrate information, advice, and instruction	X	X	X	✓
Instructor / Author controlled	✓	X	✓	X
Linear	✓	✓	✓	X
Software driven	X	✓	X	✓
Modular	✓	X	✓	X
Interactive	✓	✓	X	✓

Although most of the above methods can be used for instruction, only EPSS provides or encompasses the full range of attributes necessary to provide or fulfill all the information needs identified. It integrates components such as information, tools and advice to users (Remmers, 1998:9).

It was decided not to use EPSS for the proposed web site on making yoghurt, due to time constraints and the lack of appropriate technology.

3.10 General considerations in the design of a web site

The development and design of a web site is an ongoing activity. The currentness and continuous maintenance of the web site is important. The level of expertise of the intended user should also be considered (De Jong & Sarti, 1994:1; Lynch & Horton, 1997:2). A well-designed web site should accommodate both the skills and interests of both novices and expert users.

There are a number of aspects that need to be considered carefully before any decision is taken on design. These aspects are related to text design, screen design and navigation.

3.10.1 Text design considerations when developing a web site

The text conveys a story line and communicates ideas to the user. It is important to make sure that it conveys information effectively and interestingly. The text should be easy to read and interpret. When decisions on text design are taken, the following aspects should receive attention: length of lines, formatting, typeface, language and what to avoid in text design.

3.10.1.1 Length of lines in text

The length of lines in a text influence readability and understandability.

- Text lines of not longer than 40-60 characters (8-10 words) per line should be used.
- Paragraphs should be brief and information should be in small manageable units.
- One main idea per paragraph should be conveyed, one chunk of information at a time.
- Information should be arranged in a nonthreatening manner so that users are not overwhelmed by the amount of information (Adendorff, 1999b:1, 3, 5; Alessi & Trollip, 1991:35; Dobrovolny, 1995:1; Fleming & Levie, 1993:107-108; Gery, 1991:142; Hannafin & Peck, 1988:201; Heckel, 1982:50-52; Lappas & Kekkeris, 1996:1; Lynch & Horton, 1997:1; Nielson, 1997:1; Price, 1988:70-72, 152; Reeves, 1994:5, 11; Remmers, 1998:2; Schwier & Misanchuk, 1993:212, 214, 226, 233).

3.10.1.2 Formatting of text

Formatting of text is very important to enhance the appearance and usability of text on a screen.

- Text formatting conveys contents hierarchy and structure.
- The text should preferably appear on a single screen at the same time, but no more than 12 lines per screen should be used for computer-based training.

- It is important to check the web site with different browsers, because browsers interpret HTML tags differently (especially some table tags) and may lead to slight differences or serious problems. Most of the browsers support HTML 3.0, Javascript and Java.
- Text should be left justified to ensure that it is easy to read
- Bulleted lists provide a condensed and effective way of communicating a lot of information. Aspects to consider when making such lists are:
 - begin each line with a capital letter;
 - omit punctuation marks;
 - end sentences with a period;
 - arrange lists vertically; and
 - avoid commas or marks to separate items

(Adendorff, 1999b:4, 5; Alessi & Trollip, 1991:35; Dobrovolny, 1995:2-3; Fleming & Levie, 1993:111; Gery, 1991:142; Lappas & Kekkeris, 1996:1; Lynch & Horton, 1997:1-3; Nielsen, 1997:2; Price, 1988: 150-152; Reeves, 1994:5, 8, 13; Remmers, 1998:2; Schwier & Misanchuk, 1993:215, 242; Waldeck, 1999:4).

3.10.1.3 *Typeface selected for text*

The typeface selected to convey information on the screen also plays an important role in the readability of the text.

- When choosing a typeface use one font throughout the web site or document.
- Sans serif fonts are easier to read on a screen than other fonts.
- It is easier to use embedded *Windows* fonts. Remember to specify the font in the web document, or it will default to the user's designated

browser preference. *Netscape Navigator* includes a tag which overrides preference setting of the user.

- Fonts are displayed differently *Macintosh* and *Windows* operation systems. It is essential to specify fonts in both systems. In *Windows* the font is 2 times larger than in *Macintosh* and 12pt Times in *Macintosh* looks like 14pt Times New Roman in *Windows*.
- Size of the font should be varied. Different styles (**bold** / *italic*), highlighting and contrast or inversed text can be used to attract attention.
- Size should be large enough to be read comfortably
- Underlining is useful for emphasizing titles but if used in text it will interfere with readability.
- The type used should contrast with the background colour. Black type on white gives optimal contrast. On a dark background the colours of preference are: white, yellow, orange, green, red, blue and violet. On a light or white background the colours of preference are: black, red, orange, green, blue, violet and yellow
(Adendorff, 1999b:2; Alessi & Trollip, 1991:37; Dobrovolny, 1995:1-3; Fleming & Levie, 1993:108-109; Hannafin & Peck, 1988:185-186; Heckel, 1982:39, 77; Jones & Okey, 1995:7-9; Lappas & Kekkeris, 1996:2; Lynch & Horton, 1997:2-4; Price, 1988:150, 152, 156, 159; Reeves, 1994:16; Schwier & Misanchuk, 1993:237-242; Vaughan, 1998:187-190; Waldeck, 1999:4-8).

3.10.1.4 Language used in text

Language used in a text must be carefully formulated and edited, to ensure optimal understandability.

- The clarity of formulation in the text is important.
- The language used should be compatible with usage.
- Sentences should be written in active voice and action verbs used.
- Informal language should be used.
- Personal pronouns should be used.
- Familiar examples should be chosen
(Adendorff, 1999b:2-3 ; Alessi & Trollip, 1991:43-44; Heckel, 1982:31-36, 74-76; Price, 1988:154; Lappas & Kekkeris, 1996:1; Remmers, 1998:23; Schwier & Misanchuk, 1993, 214-215).

3.10.1.5 What to avoid in text design

Apart from all the requirements mentioned above, there are a number of aspects of text design that should be avoided.

- Scrolling, which is similar to what is used in word processing, especially in computer-based instruction or training, because few people (< 10%) scroll beyond what is visible on the screen.
- Blinking is distracting and should not be used.
- Multiple fonts should not be used.
- Block capitals (upper case) are difficult to read, but can be used selectively with great effect to emphasize text.
- Text that is too dense (grey mass), it affects readability.
- Text running around graphics should be avoided.
- Avoid “jargon”, because text should be understandable for all users.
- Negative statements
(Adendorff, 1999b:5; Alessi & Trollip, 1991:35; Dobrovolny, 1995:1, 3; Fleming & Levie, 1993:106, 109; Heckel, 1982:184; Lappas & Kekkeris, 1996:2; Lynch & Horton, 1997:2-4; Nielsen, 1996a:2;

Nielsen, 1996b:1; Price, 1988:150,153; Reeves, 1994:16; Schwier & Misanchuk, 1993:240-242; Waldeck, 1999:4).

3.10.2 Screen (Interface) design

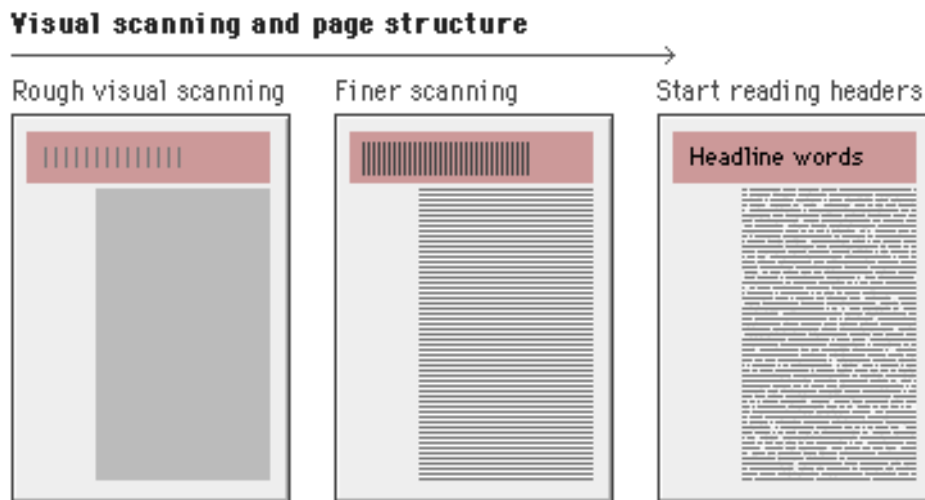
The screen or interface design refers to what the user sees when he looks at a computer screen. It deals with communication with the user. It can be direct, which is a dialogue with feedback and control throughout the web site, or indirect, which involves background or batch processing (Marion, 1999b:2).

The following aspects of screen or interface design, should improve communication capabilities. They are communication with the user, use of white space, arrangement of information on the screen, feedback to user by the web site, use of menus, tables, colour, icons, graphics and images on the screen, screen size and what to avoid in screen design.

3.10.2.1 *Communication with the user*

- The top 10 cm of the screen is the most crucial because it is the area most users should see first.
- Identification should be provided for each screen, preferably with the name of the institution and plainly worded reminder of the screen content.
- Overview or summary screens (menus) permit easy access to any location, file, place or screen in the site.
- Interaction and interest can be achieved by developing and maintaining balance between visual sensation, text information and interactive multimedia links.

- Users should be provided with a visual stimulus to maintain interest while, the computer is preparing to present the requested information.
 - The interface should be clear, simple and transparent.
 - Visual hierarchy should be created to lead reader through screens by taking notice of the way readers read web documents. Text can be scanned in different ways:
 - 1st scan – sees a large mass of shape and colour on a screen with foreground elements contrasted against a background field (figure 4.2)
 - 2nd scan – picks out specific information, first from the graphics and then from the rest (figure 4.2)
 - 3rd scan - reads individual words and phrases (figure 4.2)
- (Adendorff, 1999b:1, 2, 4; Craig, 1999:155; Dobrovolny, 1995:3; Heckel, 1982:26-28, 68-69, 70-72, 84-85; Jones & Okey, 1995:4-6; Lynch & Horton, 1997:1-4, 14; Maddux, 1998:26-27; Millheim & Harvey, 1998:54; Nielsen, 1996a:1-3; Price, 1988: 158-159; Reeves, 1994:2; Remmers, 1998:14, 17, 23; Schwier & Misanchuk, 1993:212, 214; Waldeck, 1999:8).

Figure 3.8 Visual scanning and screen structure

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3.10.2.2 Use of white space

White space is space not devoted to text or graphics on the screen and can be used effectively to achieve the following:

- It increases ease of reading.
- It minimises memory load.
- It brings together and separate ideas and areas.
- It decreases overpowering effect of screen.
- It creates unity especially where elements belong together
- It is a prerequisite for effective use is that the overall density should be 25-40% of the screen. Blank lines between paragraphs help to ensure this

(Adendorff, 1999b:2-3; Dobrovolny, 1995:3; Fleming & Levie, 1993:106-107; Lynch & Horton, 1997:3; Reeves, 1994:6, 8, 12; Schwier & Misanchuk, 1993: 221; Waldeck, 1999:8).

3.10.2.3 Arrangement of information on the screen

There are various aspects when deciding on how information on the screen has to be arranged. Among these are the following:

- The title should appear on in upper left hand of the screen.
- The display should predictable, regular, consistent and balanced.
- The web site should be divided into separate chunks of information giving learners a feeling of accomplishment.
- Information should be arranged to give an overview of a topic first that acts as a top layer of information. As users need more information they can move progressively deeper through the layers of information (by using pop-up menus, buttons, or hot text).
- Because western readers of English read from left to right and from top to bottom, it is best to organize design and layout of a screen to accommodate the natural reading process

(Adendorff, 1999b:2, 4; Alessi & Trollip, 1991:35; Dobrovolny, 1995:1-3; Fleming & Levie, 1993: 112; Hannafin & Peck, 1988:201; Jones & Okey, 1995:4-6; Lynch & Horton, 1997:1-4, 12; Reeves, 1994:3-4, 7, 9; Schwier & Misanchuk, 1993:213, 215, 218, 254; Vaughan, 1998:193).

3.10.2.4 Feedback to user by the web site

It is essential to supply feedback to users to ensure optimal success when using a programme. Feedback can include the following:

- Section titles, standard borders for specific types of information, constant backgrounds for a particular section, and even icons can let users know where they are and what they can expect.
- Provision of an indication of how many screens there is, if a linear web site is used
(Jones & Okey, 1995:7-9; Lynch & Horton, 1997:1, 2; Reeves, 1994:9).

3.10.2.5 Use of menus on the screen

The use of menus on the screen is essential for navigation and to find appropriate information. The following considerations should be taken into account:

- Menus provide the primary means of allowing learner control.
- It provide for user-entered search terms if these terms are available.
- Menus should preferably be on the edges of the screen.
- Menus should have a vertical layout, because it is easier to read.
- The location of menus depends on the available screen space and the function of the selectable areas.
- Menus allow users to access information in a user-determined order
(Adendorff, 1999b:2, 4; Dobrovolny, 1995:2; Fleming & Levie, 1993:112; Heckel, 1982:68-69; Jones & Okey, 1995:4-6, 7-9; Lynch & Horton, 1997:2, 4; Price, 1988: 139, 144; Reeves, 1994:4; Remmers, 1998:13, 23; Schwier & Misanchuk, 1993:213, 218, 254; Vaughan, 1998:193).

3.10.2.6 *Use of tables on the screen*

Tables can provide useful information in the following instances:

- Simple tables can be used to summarize complex information.
- Tables should only be used where appropriate
(Lynch & Horton, 1997:2; Reeves, 1994:15).

3.10.2.7 *Use of colour on the screen*

The use of colour on the screen improves the appearance and also helps the user in the following ways:

- Colour is used to draw eye to particular point.
- The correct use of colour improves cognitive processing.
- Green is a colour that is not easily readable. Yellow and green are easily recognized. Red and blue is the most difficult to recognize and should be avoided for text or detailed pictures.
- Background colours should be pastel shades or colours found in nature.
- The use of different colour values should be limited to not more than two.
- The use of colours should be consistent with conventional meaning of such colours, which are:
 - red stop, danger, financial loss, hot
 - yellow caution, cowardly, deserts

 - green go, envy, earth, forests
 - black financial gain

- blue cold, water, depressed mood
(Adendorff, 1999b:4, 10; Alessi & Trollip, 1991:42; Gery, 1991:138; Lappas & Kekkeris, 1996:2; Lynch & Horton, 1997:2; Price, 1988: 159; Schwier & Misanchuk, 1993:247).

3.10.2.8 Use of icons for navigation

Icons provide shortcuts to information and improves navigation within a programme.

- Icons are subjectively more desirable than text for concrete and abstract concepts.
- Icons should be unambiguous and should represent only a single object or action.
- Simple line drawings are ideal.
- Buttons can be highlighted or animated to show users which choice has been made. The duration of highlighting or animation should be long enough to be registered visually, but short enough so that users need not wait for an animation to pass so that they can get to the information they want.
- The use of visual effects should be consistent.
- Pop-up menu for icons should inform the user of the meaning of the icon

(Dobrovolny, 1995:2; Jones & Okey, 1995:4-6; Remmers, 1998:24; Schwier & Misanchuk, 1993 250; Waldeck, 1999:10).

3.10.2.9 Use of graphics and images

The use of graphics and images on a screen provides variation and makes it more interesting. Graphic representation also enhances understandability of information. It has the following advantages:

- It has a representational function for quick communication and is easily understood.
- It has a decorative function and draws attention to important concepts and does not demonstrate the computer's capabilities.
- It has a transformational function and reinforces lesson objective.
- It has an organizational function. Text and graphics on a screen should support each other if information is organized into coherent structure.
- Cartoons assist in developing a situated learning experience.
- JPEG (Joint Photographic Experts Group) and GIF (Graphics Interchange Format) images are displayed in most browsers and can greatly enhance a web site.
 - JPEG is a standardized image compression mechanism. Different levels of compression are possible. It is used for compressing full-colour (24 bit) photos or graphics or grey-scale digital images of real world scenes. It is superior for storing these images. It is lossy where the image you get is not exactly what was put in and colour information is lost each time it is edited and saved. Q75 (75 %) compression is the best choice size.
 - GIF can display 216 colours with one transparent colour. It is used for the compression of line art or graphics with relatively few colours. It is a compressed lossless format where the same quality is maintained each time it is edited and saved.
 - PNG (Portable Network Graphics Format) is a graphics format not recognized by all browsers. It is superior to GIF and gives

better compression. It supports millions of colours and is supported by *Netscape Navigator 4.03* and above (Adendorff, 1999b:5; Fleming & Levie, 1993:86-96, 113; Gery, 1991:139-140; Lappas & Kekkeris, 1996:1-3; Le Page, 1999:31; Lynch & Horton, 1997:4; Mayer & Gallini, 1998:715; Rible, 1999:1-8; What is the difference, 1998:1-3).

The following aspects should however be kept in mind:

- The use of graphics should be kept to a minimum and be as small as possible. Ideally there should be a description behind the graphic ("ALT" tags in HTML) of what the user is missing if they do not have the time or patience to wait for the complete picture to download.
- Avoid concentrating on graphics to the detriment of effective instruction.
- Image size and depth is important. A file size which is smaller with lower colour depth loads much quicker (Adendorff, 1999b:5; Fleming & Levie, 1993:86-96, 113; Gery, 1991:139-140; Lappas & Kekkeris, 1996:1-3; Le Page, 1999:31; Lynch & Horton, 1997:4; Mayer & Gallini, 1998:715; Rible, 1999:6; Schwier & Misanchuk, 1993:246-247; Waldeck, 1999:5).

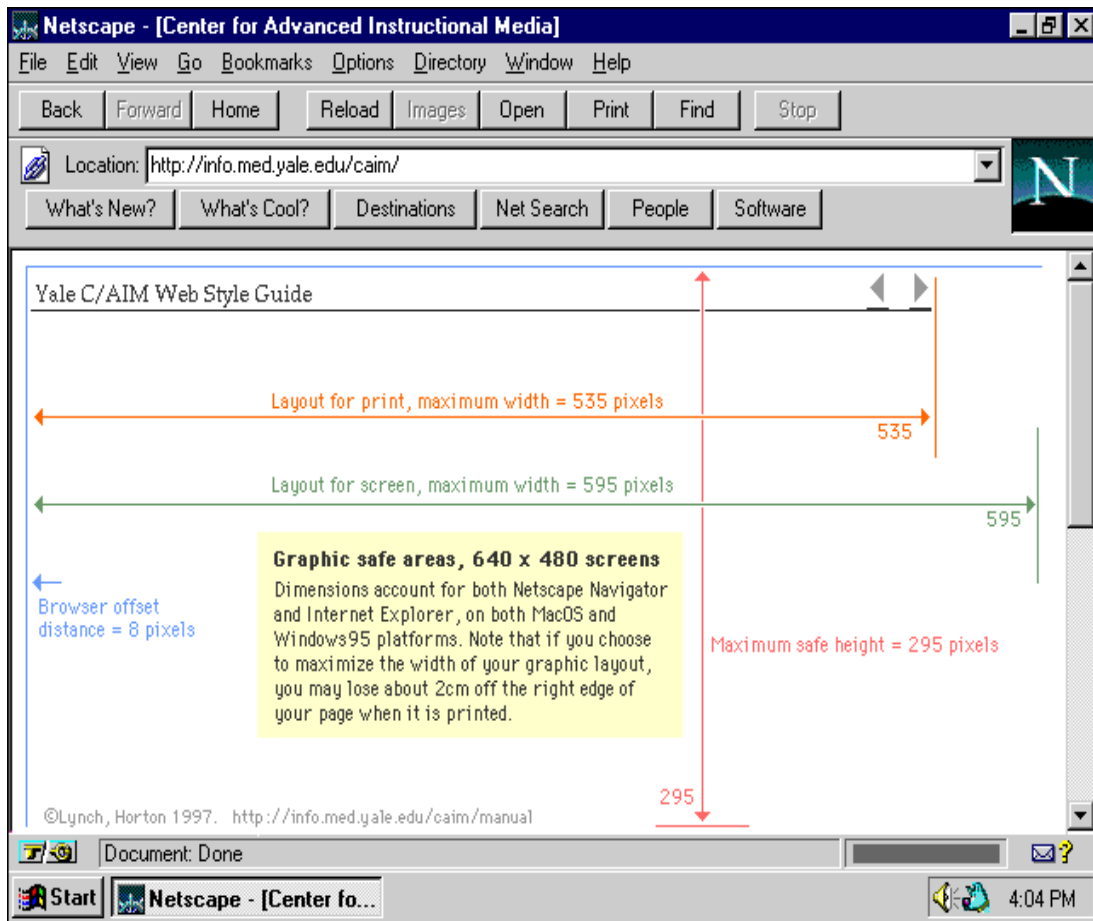
3.10.2.10 Screen size

The size of the screen on which the information is displayed is also important for effective use of a web site:

- The two centimetres on the right side of the screen lost is if user prints a wide screen.
- The text which can be printed should be designed to be printed properly.
- The graphic safe area dimensions for:
 - printing layouts are:
 - maximum width 535 pixels
 - maximum height 295 pixels
 - the layout for maximum screen usage is:
 - maximum width 595 pixels
 - maximum height 295 pixels.
- Minimum scrolling enhances efficiency of interaction and use.
- It is time consuming to adjust screen to view information.
- The use of templates (figure 3.9) for initial design ensures correct placement of text and graphics

(Adendorff, 1999b:5; Alessi & Trollip, 1991:35; Heckel, 1982:184; Lynch & Horton, 1997:1-3).

Figure 3.9 Safe areas on *Windows* operating system for *Netscape Navigator*



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3.10.2.11 What to avoid in screen design

For effective display of information, there are a number of usages that should be avoided. These include the following:

- Menus should not have fewer than 4-5 links.
- Nested menus should not be used.

- Large graphics with long loading times beyond irritation value of 10 seconds should be limited.
- Vertical menus which take up too much space.
- Visual or iconographic maps can be complex and confusing for users.
- Graphics can be rendered unviewable when using different browsers and settings.
- No graphics should appear above the title on the screen.
- No graphics and text should appear beyond the horizontal width of the screen (640 pixels).
- Too bold screen design can repel users.
- Dull screens of solid text appear as a grey mass.
- A dark background reduces the legibility of a site.
- Frames should not be used as problems are encountered when printing, saving, downloading and bookmarking information (Jones & Okey, 1995:4-6; Lynch & Horton, 1997:1-4; Nielsen, 1996a:1-3; Nielson, 1996b:1-4; Price, 1988: 144).

3.10.3 Navigation in the web site

A user should be able to find his way on a web site by navigation. Navigation aids allows interaction of the user with the text and web site. Some navigation components which can help the user to find information are the design of the site as a whole, the home page of the site, the use of links, control of usage of a web site, feedback given by the programme, access to information and what to avoid in navigation design.

3.10.3.1 Design of the site as a whole

- Clear consistent design should be used throughout the site, allowing the user to adapt to the design and reduces guessing and anxiety

(Craig, 1999:155; Dobrovolny, 1995:2; Jones & Okey, 1995 7-9; Lynch & Horton, 1997:1; Remmers, 1998:18).

3.10.3.2 Home page of the site

- The home page is the entry point to the site and should give an indication of date of publishing of the web site, its origin and what is “new” on the site

(Craig, 1999:155; Lynch & Horton, 1997:1).

3.10.3.3 The use of links

- A link is an area of the screen which cause a certain action to occur when clicked on. It can be:
 - invisible buttons (text or graphic), called a “hotspot”; or
 - icons or graphics.
- Labels indicating links should be unambiguous.
- Links should be in a contrasting colour, which clearly indicates active, visited links.
- Links add interactivity to a web site.
- The Universal Resource Locator (URL) and a link to the home page should appear on every screen.
- Links should also be activated by clicking on word like activate or click here

(Craig, 1999:155; Dobrovolny, 1995:2; Jones & Okey, 1995:4-6; Lappas & Kekkeris, 1996:1; Lynch & Horton, 1997:1, 3; Maddux, 1998:26-27; Marion, 1999b:2; Millheim & Harvey, 1998:54; Nielsen, 1996:1-3; Remmers, 1998:24; Schwier & Misanchuk, 1993:251-254).

3.10.3.4 Control of usage of a web site

- Similar control icons should be used for all types of media, scroll bars or arrows, and should be used on video and audio as well as text.
- If the content is not in a long linear stream, it permits learners to control their own learning.
- Control options should appear in consistent areas
(Adendorff, 1999b:3; Dobrovoly, 1995:1-3; Heckel, 1982:50-52; Jones & Okey, 1995:6; Lynch & Horton, 1997:3; Price, 1988: 70-72; Reeves, 1994:6, 10; Remmers, 1998:12; Schwier & Misanchuk, 1993:226).

3.10.3.5 Feedback given by the programme

- Users should be provided with feedback to let them know if they have to wait when significant time delays are required for the web site to access information - threshold of frustration for users are estimated at 10-15seconds.
- A web site should be compact and effective to ensure that the user stays with the web site. If a user clicks on a web site or link and do not get a response or something to read within 30 seconds, they have lost interest.
- Cues should be used to give an indication of what follows and the alternatives available.
- When using linear presentation the “going back/ previous screen” function is essential.
- Bibliographies and frequently asked questions should be included

(Le Page, 1999:31; Lynch & Horton, 1997:1, 3; Millheim & Harvey, 1998:56; Nielsen, 1996:1; Remmers, 1998:17).

3.10.3.6 Access to information

- Users access information either online, or using a delivery medium, such as downloading or printing. A programme should provide for both, if required

(Lynch & Horton, 1997:1, 4; Nielsen 1997:1-3).

3.10.3.7 What to avoid in navigation design

The following aspects should be avoided to ensure effective navigation:

- There should not be too much graphics on the home page.
- No dead-end screens or nowhere screens should be present.
- The home page should not contain more than two (640x480 pixels) screens.
- The use of “bleeding edge technology” which may cause browsers to crash, especially older ones which are not able to show it, should be avoided

(Lynch & Horton, 1997:1; Nielsen, 1996a:1).

3.11 Conclusion

As can be seen from the above, a large variety of factors need to be studied, evaluated and compared before decisions can be taken or choices made. Factors include the use

of computers, multimedia and the World Wide Web, structures, design of a web site, design and navigation issues.

3.11.1 Computers

Computers are useful tools for the processing and interpretation of data by farmers (Boerdery ..., 1999:1). Almost two thirds of the 50 000 commercial farmers in South Africa use computers regularly (Van Zyl, 1998:12). The computer literacy of farmers is increasing as more and more use the Internet regularly and realise the benefits of the computer, especially for word processing, financial statements and tax purposes. A web-based information resource for farmers can therefore be considered viable.

3.11.2 Multimedia

Multimedia is the combination of sound, text, graphics, animation and video. For this prototype web site, desktop multimedia was chosen where only text and graphics are used to create an interactive, partially nonlinear prototype web site. Fully interactive multimedia could not be used, because the envisaged target audience should not be able to access it. *Dreamweaver* as a writing tool for the HTML coding of the web site was selected from possible alternatives.

The web site should be written in such a way as to be available on as wide a platform as possible, both on the World Wide Web (accessible by all browsers), and on CD-ROM. New MPC standards computers are not generally used and some users may not have CD-players. The different levels of competency of users should be taken into consideration in the design of the web site. This should help to overcome the barriers which exist.

3.11.3 Structure

The design of a web site should take the various categories of web use into consideration when deciding about what should be included in the final site. For the purposes of this prototype web site on yoghurt making, aspects of both the training and teaching categories should be incorporated. Users of this site should probably also often use the web site for reference to check facts such as temperatures, energy requirements. Web surfers will probably just look at the home page.

Different structures should be considered. For this web site two structures used for web sites were chosen. A linear structure was used for the QUICK TOUR. This should be a basic information tool, allowing the user to move forwards only. The content of this part of the web site consists of only definitions and indications of the whole process.

The second part is the COMPLETE PICTURE, which is based on an empirical structure allowing for interaction between the web site and the user. The user controls his or her own experience and can make a choice as to what information should be accessed. There are links to the home page on all screens and parts of the web site should be in a linear format. The combination of the two processes should ensure that as wide an audience can be addressed: those who are only interested in very basic information, and those who want to spend some time to get detailed information.

3.11.4 Computer-based instruction

The inclusion of a computer-based instruction method was considered to be essential for this web site. An EPSS system would have supplied the best solution for the information needs of both farmers and advisers. (Remmers, 1998:14). It was however

not possible to use an EPSS for this web site due to limitations in time and technology available.

3.11.5 Design considerations

Based on the literature review, aspects described as desirable for text design, screen design and navigation were selected and implemented in the development of the prototype web site.