The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

By

Heléne Coetzee

Submitted in partial fulfilment of the requirements
for the degree

DPhil

Supervisor: Department of Information Science

Prof. Dr J. C. Cronjé   University of Pretoria

February 2000

Acknowledgements

I wish to convey my sincerest thanks to the following people:

- Prof. Dr J. C. Cronjé - Promotor for his guidance and support.

- Mrs H S Coetzee - my mother for her assistance, motivation and support.

- Mrs Christa North and Mrs Linette Downes-Webb - for invaluable advice and assistance.

- Mr John North - for his technical assistance and help in finalizing the CD-ROM.

- All the evaluators, friends and family who assisted and supported me.

Heléne Coetzee

February 2000

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-ii-

Summary

Agricultural conditions in South Africa have changed considerably over the last number of years. To enable farmers to stay on their farms and survive, many are turning to new ventures, such as processing and marketing farm produce themselves. To do it successfully, they need information. Although sources of agricultural information are available, they are often not really suitable to meet this need.

Agrelek has been advising farmers for many years on the effective use of electricity in agriculture. After consultation with Agrelek, it was decided to develop FARMPRO, a prototype web site and a CD-ROM, on making yoghurt on the farm., because many farmers have surplus milk which can be used to make a variety of yoghurt types.

Farmers have specific information needs and their information seeking behaviour is unique. Information seeking behaviour models were considered and a new model was developed. The information needs of dairy farmers were determined by applying a framework for assessing information needs. The aspects on which information will be useful was established.

Against this background, all aspects relating to the design of a web site suitable for use by the target group was identified. Desktop multimedia was selected as the most suitable medium for making the information available. Because the number of farmers using the Internet is increasing, it was decided to make this information available on the World Wide Web, but also on CD-ROM. Structures for constructing a web site were compared and the most suitable selected. HTML and *Dreamweaver* was used for the construction of the web site. The use of an Electronic Performance Support System (EPSS) was considered, but could not be implemented due to technological and time constraints. Aspects relevant to text design, screen design and navigation, were considered and choices made for the design a suitable information resource.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-iii-

The actual development and evaluation of the prototype web site was done in three phases. Both formative and summative evaluation methods were used. The first two phases were evaluated by class mates and a few individuals. The third phase prototype was evaluated by twenty-five evaluators, representing food scientists, agricultural engineers, dairy farmers, language and design experts and novices. A questionnaire was made available on the World Wide Web, together with the prototype web site. Questions were divided into : content, navigation, ease of use, and overall impression. Responses to the questionnaire were analysed and changes made as far as possible in reply to comments and suggestions by the evaluators. A final version of the prototype web site was completed.

A number of conclusions can be drawn from experience gained during the development of the web site. It is very important to understand the target group: their characteristics, information seeking behaviour and information needs, to be able to cater specifically for their needs. The availability of agricultural information in a suitable format for all groups in the farming community, also those who are not computer literate or have access to computers or the Internet, have to be considered.

Topics on which future web sites can be developed, must be identified. The best possible medium for making information widely available must be selected. When the prototype web site and the CD-ROM become more widely available, it is anticipated that it will become clear which direction future web sites should take.

List of terms: dairy farmers, yoghurt preparation, web site, information resource, information needs, information seeking behaviour, screen and text design, navigation, EPSS, evaluation.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-iv-

Opsomming

Landboutoestande in Suid-Afrika het aansienlik in die laaste paar jaar verander. Om
boere in staat te stel om op plase aan te bly, word nuwe metodes om te oorleef op die
proef gestel, soos die prosessering en bemarking van plaasprodukte. Hiervoor word
inligting benodig. Alhoewel landbouinligting beskikbaar is, beantwoord dit nie altyd
aan die behoeftes van hierdie boere nie.

Agrelek adviseer boere al vir 'n geruime tyd oor die effektiewe gebruik van elektrisiteit
op die plaas. Na konsultasie met Agrelek is besluit om FARMPRO te ontwikkel. Dit is
'n prototipe webwerf en CD-ROM, oor die maak van jogurt op die plaas. Baie boere
het surplus melk wat gebruik kan word om 'n verskeidenheid soorte jogurt te maak.

Boere het spesifieke inligtingsbehoeftes en hul inligtingsoekgedrag is uniek. Verskeie
inligtingsoekmodelle is oorweeg en 'n nuwe model is ontwikkel. Die
inligtingsbehoeftes van suiwelboere is bepaal deur die toepassing van 'n raamwerk vir
die bepaling van inligtingsbehoeftes. Die aspekte waaroor inligting deur die
teikengroep benodig word, is bepaal.

Teen hierdie agtergrond, is van alle aspekte van die ontwerp van 'n webwerf, geskik
vir die teikengroep geïdentifiseer. *"Desktop"* multimedia is gekies as die mees geskikte
medium vir die beskikbaarstelling van die inligting . Omdat die aantal boere wat die
Internet gebruik toeneem, is besluit om die inligting ook op die *"World Wide Web"*, en
op CD-ROM beskikbaar te stel. Strukture vir die konstruksie van 'n webwerf is
vergelyk, en die mees geskikte is geïdentifiseer. HTML en *Dreamweaver* is gebruik vir
die bou van die webwerf. Die gebruik van 'n *"Electronic Performance Support System"*
(EPSS) is oorweeg, maar kon nie geïmplementeer word nie as gevolg van tegnologiese
en tydsbeperkinge. Aspekte van teksontwerp, skermontwerp en navigasie, is oorweeg
en keuses gemaak om te verseker dat 'n inligtingsbron wat geskik is vir gebruik deur
suiwelboere ontwikkel word.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-v-

Die ontwikkeling en evaluering van die prototipe webwerf is in drie fases gedoen. Beide formatiewe en summatiewe evalueringsmetodes is gebruik. Die eerste twee fases is geëvalueer deur medestudente en 'n paar individue. Die derde fase is deur vyf-en-twintig evalueerders, wat voedselwetenskaplikes, landbouingenieurs, suiwelboere, taal- en ontwerpspesialiste en amateurs ingesluit het geëvalueer. 'n Vraelys is op die *"World Wide Web"*, geplaas saam met die tesame met die prototipe. Vrae oor inhoud, navigasie, gemak van gebruik, en algehele indruk is ingesluit. Die antwoorde op die vrae is ontleed en veranderings is waar moontlik aangebring in ooreenstemming met aanmerkings en voorstelle van die evalueerders. 'n Laaste weergawe van die prototipe webwerf is voltooi.

'n Aantal gevolgtrekkings kan gemaak word na aanleiding van die ondervinding wat met die ontwikkeling van die webwerf opgedoen is . Dit is baie belangrik om die teikengroep te verstaan, sowel hulle eienskappe, inligtingsoekbehoeftes en inligtingsoekgedrag, sodat so ver moontlik aan hulle behoeftes voldoen kan word. Die beskikbaarstelling van landbouinligting in 'n geskikte formaat aan alle groepe in die landbougemeenskap, insluitend die wat nie rekenaargeletterd is nie óf nie toegang tot rekenaars of die Internet het nie, moet ook in ag geneem word.

Die tema van toekomstige webwerwe moet geïdentifiseer word. Die mees geskikte medium om die inligting beskikbaar te stel moet gekies word. Sodra die prototipe webwerf en die CD-ROM geredelik beskikbaar word, sal dit duidelik word watter rigting toekomstige webwerwe moet inslaan.

Sleutelterme: suiwelboere, jogurtmaak, webwerf, inligtingsbron, inligtingsbehoeftes, inligtingsoekgedrag, skerm- en teksontwerp, navigasie, EPSS, evaluering.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-vi-

Table of Contents

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-vii-

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-viii-

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-ix-

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-x-

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-xi-

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-xii-

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-xiii-

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-xiv-

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-XV-

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-xvi-

Heléne Coetzee - 2000 The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-xvii-

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-xviii-

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-xix-

List of figures

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-xx-

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-xxi-

List of tables

Heléne Coetzee - 2000　　The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

-xxii-

Chapter 1: Introduction

1.1   Introduction

This thesis reports on the development of a prototype web site for small to medium scale farmers who are interested in making yoghurt on the farm. This web site should enable them to consider a variety of yoghurt products, as well as requirements for production, before any costs are incurred. The prototype web site can also serve as an aid to the advisers of Agrelek.

Agrelek as part of Eskom, the national electricity provider in South Africa, was established in 1988. It is an advisory service assisting the agricultural sector in the cost-effective and efficient use of electricity.   Agrelek Electrotechnology Centre, situated at the Glen Agricultural College near Bloemfontein, was established as a demonstration centre for the latest electrotechnologies applicable to farming (Agrelek, 1999:1).

In consultation with Agrelek, the manufacture of yoghurt was selected for this prototype web site, because quite a number of farmers have surplus milk available on their farms.   A HTML document for use on the web as well as a CD-ROM of the proposed prototype web site, was developed. As far as can be determined no product of this kind is currently available in South Africa. It is envisaged that similar web sites for other products that can be made on the farm, will be developed in the future.

In the past few years, many changes affecting farming activities, have taken place in South Africa. These changes are, among others, the abolishment of control boards regulating the marketing of agricultural products, the opening of world markets for agricultural products from South Africa and accelerated land reform, enabling more people to own land and farm on a small scale (Jordaan, 1999:45).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

1

In order to adapt to these changes and to survive and prosper, many farmers are compelled to turn to a variety of small-scale operations, using available resources. They can no longer afford to put in only one crop per year. Producing a variety of products throughout the year can ensure a regular cashflow and income. It enables more people in the agricultural sector to remain productive and also provides employment to others.

It can however be a costly experience to experiment making new different products, before finding a viable solution. Small and medium scale farmers need usable information to be able to consider a variety of possibilities and make an informed decision on which product to select. This information should also be suitable for application under South African conditions.

A number of sources of agricultural information are presently available, but as far as can be established, the Internet has not yet been utilized to a significant extent as a method of supplying of information specifically to South African farmers. Many farmers presently have access to the Internet, and if applicable information is available, it can prove to be a useful source of information.

Before the development of the web site is discussed, a brief overview of the current state of agriculture in South Africa should be given. Against this background the needs of dairy farmers are discussed and the steps in the development of the web site and its evaluation described.

1.2 Aim of the study

The aim of this study is to arrive at an understanding of the relationship between users of information and the presentation of such information in a web-based format. The

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

2

web site for making yoghurt on the farm, is called FARMPRO. It consists of information integrated from a large variety of sources. It is presented in a format suitable for the target group, which consists of farmers who want to make yoghurt on a small or medium scale, as well as the Agrelek advisers who have to advise them on suitable processes to achieve this aim.

The information on the web site should be adequate to meet the needs of both groups. The information is also adapted to local conditions, taking both legislative requirements, as well as the constraints experienced by the South African farmer into consideration. The web site gives information on possible kinds of yoghurt that can be made on small or medium scale. As an additional aid, farmers can also obtain information on how to put together a business plan and do a feasibility study. Sources which can help to obtain financing for such a venture are also suggested. A quick tour which can be scanned as an overview, is available to users of the web site, as well as a complete picture with all the necessary information on yoghurt making.

FARMPRO provides information on the following aspects of yoghurt production:
- product description;
- legal requirements;
- processes;
- equipment;
- packaging;
- storage / shelf-life;
- energy requirements; and
- suppliers.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

3

In consultation with Agrelek, it was decided to develop a web site on the manufacture of the following types of yoghurt:

- set yoghurt – low fat and fat free;

- set yoghurt – high and full fat;

- stirred yoghurt – low fat and fat free;

- stirred yoghurt – high and full fat;

- long life yoghurt dessert – set;

- long life yoghurt dessert – stirred;

- drinking yoghurt; and

- frozen yoghurt.

The success of this web site should be an indication of the demand for more information products of this kind. In the design of this web site, the needs of farmers should be established and taken into consideration. Understandability and ease of use should be prime considerations. Surveys have shown that almost two thirds of the 50 000 commercial farmers in South Africa use computers regularly and this should increase (Van Zyl, 1998:14). It is envisaged that this web site will be made available on the Internet as well as on a CD-ROM.

1.3 Agriculture in South Africa

Conditions present in the agricultural sector in South Africa, differ to a large extent from those in other countries. These unique characteristics form the background to farming practices and the information needs of farmers. The following characteristics need to be considered:

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

4

1.3.1   Extent of agriculture in South Africa

Agriculture forms an essential part of the South African economy. Not only does it provide food, but also employment in areas where few if any job opportunities are available (Holt, 1991:533; Jordaan, 1999:46, 47, 48; Improved, 1999:3; Kirsten et al., 1998:54; Pickering, 1987:68; Promote, 1999:6; Van Niekerk, 1993:19).

The contribution of the agricultural sector to the Gross Domestic Product (GDP) for 1998 is estimated at **3,3%,** amounting to R673153 million (Contribution, 1999:10). Although this is a relatively small contribution, it provides income for a considerable number of people. If productivity can be increased, the income from farming can also be increased significantly.

The average productivity level of major crops and livestock enterprises in South Africa are only about 50% of their potential (Agricultural, 1999:2; Agricultural policy, 1999b:5; Improved, 1999:3; Jordaan, 1999:50; Kirsten et al., 1998:54; Pickering, 1987:79; Van Niekerk, 1993:19). The improvement in productivity levels to meet the demand of an ever-increasing population, is essential. A gap exists between theory and practice regarding optimal efficiency in production. Van Niekerk (1993:19) indicates that this gap between available knowledge and what is actually practised, seriously hampers effective farming practices. This problem has to be addressed by providing information effectively.

1.3.2   Natural factors

Farming in South Africa is influenced by extreme climatic conditions which are not favourable for optimal production. Land and water resources are deteriorating and depleted as result of, among others poor farming practices, land erosion and droughts. Rural areas are increasingly depopulated because farmers and farm workers leave

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

5

farms to seek employment elsewhere (Jordaan, 1999:46). Information on farming under various and adverse conditions and in all regions, should probably enable farmers to stay on their farms.

1.3.3   Human factors

The agricultural sector in South Africa consists of two distinctive sectors, namely a first and a third world sector. The first world sector is characterized by a post-industrial, or information society supported by highly mechanized, commercial agricultural practices. The third world sector consists of subsistence farmers, where low productivity and poor farming practices prevail (Van Niekerk, 1993:19). The per capita income in rural areas is also generally lower, leading to poor economic conditions of the inhabitants (Jordaan, 1999:46-50). Information should be provided for both sectors in a format most suited to their particular needs.

1.3.4   Regulatory factors

Farm workers increasingly insist on farming their own land, instead of working for others. Farmers are faced with new labour legislation, where minimum wages have to be paid to workers. Finding trained and motivated workers becomes increasingly difficult. The productivity level of labour available on farms is not adequate, and is very much lower than in other countries.

Increasing deregulation offers less protection to farmers. The phasing out of the control boards for most agricultural products in order to achieve a free market system in South Africa, has also led to increased uncertainty among farmers regarding the future of agriculture. Information previously supplied by the control boards, have to be found elsewhere.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

6

In an attempt to increase exports of South African products to Europe, the Government is presently negotiating to be included in the agreement between European Union (EU) countries and developing countries, where restrictions on imports are lifted. This has not as yet been successful. Requirements laid down by the free trade agreement between member countries of the World Trade Organisation (WTO) also have to be met. South Africa and the European Union are both signatories to this agreement. This agreement of the World Trade Organisation requires that 90% of all trade between countries should be liberalised and free from customs duties (Uncertainties, 1999:4). It is envisaged that the European Union should liberalise 96% of imports from SA and SA should liberalise 86% of imports to South Africa (Claassen, 1999:1; Jordaan, 1999:47: Klein, 1999:1; SA-EU deal, 1999:1; SA/EU, 1999:5; Uncertainties, 1999:4; Willemse, 1999:1). The most important effect of this agreement should be savings on customs duties. Products excluded from this agreement are beef, mutton, maize, and sugar (Klein, 1999:1; Claassen, 1999:2).

1.3.5   Economical factors

There is a marked decline in incentives for food production because of the availability of cheap imported products into South Africa from other countries where production costs are lower. It is regulated by trade agreements between these countries and South Africa (Agricultural, 1999:2; Agricultural policy, 1999a:5; Agricultural policy, 1999b:5; Farmers, 1999:15; Jordaan, 1999:47-50; Kirsten et al., 1998:54; Pickering, 1987:83; Profit by small..., 1998:43;   Promotion, 1999:1; Van Zyl, 1998:13). Information on which products can still be produced profitably under these circumstances is essential.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

7

1.3.6 Technological factors

Lack of appropriate technology available to farmers has an adverse effect on production and profits (Jordaan, 1999:27, 28, 50, 60; Pickering 1987:68, 77; Strengthen, 1999:12; Van Zyl, 1998:12-18). Most technology available does not meet the requirements of small to medium scale farmers, who often do not have the financial resources to take risks on unfamiliar innovations. The development and implementation of low-cost technologies and how to use them should benefit these farmers (Agricultural, 1999:2; Collaboration, 1999:11; Jordaan, 1999:46-48; Pickering, 1987:82, 83, 87; Promote, 1999:6; Small-scale, 1999:10; Strengthen, 1999:12).   Information on effective use of technology on the farm should be available.

This brief overview of some of the agricultural conditions existing in South Africa, forms the background against which the provision of information of farmers should be discussed.

1.4 The South African dairy industry

The factors mentioned in the previous section apply to the agricultural scene as a whole. The dairy industry in particular is characterized and influenced by some more specific factors.

1.4.1 Extent of the dairy industry

The South African dairy industry is complex and specialized, which requires high capital investment and intensive managerial input (Cronjé et al., 1999:237; Jordaan, 1999:60).   It is estimated that the dairy industry contributed almost R11 billion to the

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

8

GDP in 1998 (Van Burick, 1999:4).   The number of dairy producers in South Africa has however declined from more than 23 000 at the end of the1970's to only 5 797 in 1999 (Cronjé et al., 1999:240). This drastic decline is also reflected in the dairy industry, where a few big concerns keep the buying price of raw milk down, to the disadvantage of the farmer. More and more farmers are diversifying into either other areas of farming, or are looking at alternatives for the processing of milk on the farm.

1.4.2   Regulatory factors affecting the dairy industry

The dairy industry in South Africa has had to make the transition from a rigid and controlled marketing system to complete deregulation (Jordaan, 1999:60; Kirsten et al., 1998:54; Van Zyl, 1998:12). With the disbanding of marketing and control boards for dairy products, such as the Dairy Board, subsidies for various products were abolished. This made production less profitable (Agricultural, 1999:2; Agricultural policy, 1999a:5; Jordaan, 1999:46, 47, 60; Klein, 1999:1; Kirsten et al., 1998:54; Uncertainties, 1999:4; Van Zyl, 1998:12). Presently only five major buyers buy 77% of the milk produced (Cronjé et al., 1999:237). This practice tends to discourage small to medium scale farmers from continuing to produce milk.

The dairy industry should benefit the most from exporting to the European Union, because about R200-million in customs revenue can be saved as result of a duty-free quota for 5,000t cheese (Claassen, 1999:2; Klein, 1999:1; Uncertainties, 1999:4). Substantial investments should however have to be made to comply with European Union sanitary requirements, a factor also detrimental to the involvement of small to medium scale farmers in making products for export (Klein, 1999:1; Uncertainties, 1999:4). At present facilities on dairy farms are substandard. It is envisaged by Bertus de Jongh of the Dairy Producers' Organization that exports of milk powder, butter, cheese and yoghurt should increase to the European Union, but also to the South African Development Community (SADC) countries and Indian Ocean Islands

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

9

(Jordaan, 1999:60). Small to medium scale farmers can however exploit the local market as well and need information on the best way to achieve this for profit.

1.4.3   Economical factors relating to the dairy industry

Milk can be sold in pasteurized or in processed form. Under the current economic conditions, farmers are considering value adding to raw milk themselves. Instead of selling raw milk to large manufacturers of dairy products, it can be more profitable to make products on the farm (Co-ordinated, 1999:3; Cronjé et al., 1999:248; Kirsten et al., 1998:54; Profit by small..., 1998; Small-scale processing, 1999:25). Negative factors inhibiting ventures of this kind are finding trained staff, lack of suitable technology, competition in the marketplace and the seasonality of raw materials. Farmers trying to develop products if they do not have previous experience or adequate knowledge, are also hampered by a lack of information suitable for their particular requirements.

World markets for dairy products are controlled by the USA, Australia, New Zealand and the European Union, where the industry is heavily subsidised (Van Burick, 1999:4). These subsidies enable farmers in these countries to keep on producing dairy products, but in South Africa no subsidies are available, making prices less competitive on the local market as well as the export market. Dairy products can be imported and sold at a lower price than those produced in South Africa.

Because the South African dairy farmer cannot expect any assistance from the state, they should increase productivity to remain competitive (Jordaan, 1999:60; Van Burick, 1999:4). An increasing number of small and medium scale farmers specialize in making one or at most two products, because investment needed for the infrastructure to produce more products is not feasible. Farmers need information on

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

10

the most cost effective production methods, mechanisation of processes and the production of specialized products.

1.5 The value of information

1.5.1   What is information?

Information can be described according to Prasad (1992:9) as:

- an aggregation or processing of data to provide knowledge and intelligence;
- empowerment playing an important role in development and process;
- something that should be organised and disseminated timeously for optimum use;
- subjective; and
- that of which the value depends on the recipients' inclination.

Kaniki (1992:83), quotes Faibisoff & Ely, as defining information from the psychological approach as "that which reduces uncertainty". Kaniki (1992:83) also quotes Krikelas defining information as: "that which can be thought of as a stimulus that creates uncertainty, makes a person aware of need .... [and] creates a change in one's level or degree of certainty". Kaniki (1992:83) himself defines information as: ideas, facts, imaginative works of mind and data of value, potentially useful in decision making, question answering, problem solving, and that which can reduce uncertainty.

People can only use information if it is available. Too much information may lead to information overload and can cause confusion (Kunz et al., 1976:9). Information, of mixed or unknown quality may even be worse than no information at all (Malcolm, 1998:5).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

11

1.5.2   Types of information

Information can be divided into different types:

- procedural - which is data of investigations which are obtained, manipulated and tested;
- methodological - derived from scientific attitude;
- stimulatory - which is motivated by oneself / environmentally derived;
- policy - which is focussed on the decision making process; and
- directive - which is used for coordination and for enabling effective group activity (Prasad, 1992:12-13).

Information has no value in itself, but should lead to human action (Shannon, according to Sveiby, 1994:1-10). Information is what users ought to have to do their jobs effectively, solve a problem satisfactorily or pursue a hobby or interest happily (Nicholas, 1996:7; Prasad, 1992:1). Information is also essential in the decision making process.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

12

Table 1.1 Continuum of decision making (Prasad, 1992:6-8)

Data (letters, numbers, lines, graphs, symbols) are:

- Events and their state.

- Organised according to formal rules and conventions.

Information is:

- A cognitive state of awareness given representation in physical form.

- A physical representation which facilitates the process of knowing.

Knowledge is:

- A cognitive state beyond awareness.

- Implied active involvement and understanding.

- The ability to extend the level of understanding to meet all contingencies.

- Organised records of human experience given physically.

Wisdom is:

- Application of knowledge as contained in human judgement, centred around criteria or values that are generally accepted by culture and society.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

13

This table gives an indication of the value of information if it is used correctly. Many farmers are still at the first stage. This study aims to help farmers by also providing information based on data. Using this information, they can make an informed decision, applying the information. If they are successful in a new endeavour they have gained wisdom, based on the knowledge gained by evaluating information. It is therefore of the utmost importance to ensure that the information supplied to the farmers should be understandable, be on a level with their field of experience and presented authoritatively and correctly.

1.6   The changing face of agricultural information

The changing situation in agricultural structures and management worldwide, has brought about changes to both the suppliers of information, the information supplied and the sources of information (Klair et al., 1998:1). Some of these changes can be attributed to the structural, technological, social and market changes. There is also a direct positive link between the provision of information and development in any community (Leach, 1999:71). Information is regarded as a critical resource for both urban and rural communities (Leach, 1999:71). According to Kaniki (1992:84) there is a lack of extensive studies on the information needs relating to agriculture in the USA as well as in Africa.

A fundamental shift has taken place from the mere supply of primary information aimed at helping producers to control production costs, maximizing production and profits, to a need for educational web sites on all aspects of farming such as accounting, financial projections and analyses, tax management, budgeting, marketing alternatives and resource acquisition (Klair et al., 1998:1; Marcella & Baxter, 1999a:171; Nicholas, 1996:7).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

14

1.6.1   Structural changes in agricultural information

The modern agricultural environment is dynamic and changes quickly (Boerdery ...,
1999:1; Van Zyl, 1998:12). These changes can be economical, market-related and
technological. To ensure survival and success, farmers should react to the changing
environment (Boerdery ..., 1999:1). To make correct decisions farmers have to rely
on information (Lagrange, 1995:1; Collaboration, 1999:11; Boerdery ..., 1999:1).

1.6.2   Social changes affecting agricultural information

According to Kaniki (1992:83), agricultural development is the key to general
development in a country and especially on the African continent, where the majority
of the population is part of the agricultural and rural sector. Information enhances
agricultural development, and therefore also the general development of a country.
This statement is based on the assumption that a country can generate appropriate
technology and information through quality research. If this knowledge is applied,
productivity can improve significantly.

Available information is often focussed on policy makers, researchers, and those who
manage policy decisions. Scant attention is paid to the information needs of the
targeted beneficiaries of a particular programme. The absence of agricultural
information aimed at farmers themselves, is a key factor that has greatly limited
agricultural development in developing and even some developed countries (Klair et
al., 1998:1; Ozowa, 1995:1).

Agricultural information is often not integrated in development programmes and does
not address numerous others but related problems that face farmers (Klair et al.,
1998:1). Information is however an essential ingredient of agricultural development
programmes. Farmers seldom experience the possible impact of agricultural

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

15

innovations, either because they have no access to information about it, or because they do not have the inclination or willingness to change to something new. The attitude of prospective producers can also be changed, possibly by keeping them informed on new developments in farming practices and technology. Many still follow in the steps of their forefathers or prefer the way things were done in the past. They do not accept change readily. A large component of education is often needed to change this attitude.

Agricultural information is often not disseminated effectively, because of inadequacies in extension programmes. Some programmes are conceived without planning and launched in a hurry. Farmers at which they are aimed, and whose attitude should be changed to make them successful, are not involved in the planning of projects. Agricultural information of this kind can neither interest the farmers nor effect the desired changes. Most agricultural innovations are made known in English only, putting it beyond the reach of many. To be effective and make a difference information should be on a level with the abilities and capabilities of those at whom it is aimed (Ozowa, 1995:1-3).

1.6.3   Information about market changes

To ensure success, it is important that the prospective producer gather appropriate information before starting a new venture. Many sources of information are available, but they are often not on an understandable level or adapted to local conditions. There is a gap between theory as written about and what is actually usable in practice.

After the disbanding of the control boards this gap became even wider, because information and statistics on production, prices and marketing are no longer made available to farmers through these organizations. This hampers production and marketing decisions, (Van Zyl, 1998:12). In an attempt to fill this gap, many

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

16

processors, cooperatives and industries are using the Internet, providing web screens with information on agricultural issues (Van Zyl, 1998:12). Examples can be found at http://www.sagis.org.za - The South African Grain Industries Services, and http://www.agriinfo.co.za - Agricultural Information.   Paper-based information is also available such as LANVOKON reports up to 1997 and annual reports published by most of the producers' organisations, industries and cooperatives.

1.6.4   Information about technological changes

Technology plays an important part in modern agriculture. Suitable information on the contribution technology can make towards more profitable farming is essential. Production in the agricultural sector can be improved by using technology, again bridging the gap between theory and practice (Frank, 1987:320; Letshela, 1999:1). Technology can also be a valuable conduit in the communication of information. Theory and practice can come closer together if the correct methods of communication of information are used (Klair et al., 1998:1; Letshela, 1999:1; Van Niekerk, 1993:19).

Communication can be both direct and indirect. Direct communication takes place where feedback is inherent, for example: farmers' meetings, farmers' days and correspondence with organizations involved in agriculture (Letshela, 1999:1; Van Niekerk, 1993:19). Indirect communication is where feedback is difficult or impossible, and takes place when the generator of the information is removed from the user, for example: information as found in books, pamphlets, articles, circulars and papers at conferences (Letshela, 1999:1; Van Niekerk, 1993:19).

In the past no medium could offer an opportunity to utilise both ways of communication in a cost-effective, user-friendly way. The emergence of the Internet and more specifically the World Wide Web (WWW) has brought positive possibilities in terms of combining the two methods of communication (Letshela, 1999:1).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

17

Information from various sources can be accessed. Problems can also be addressed to experts for prompt response (Letshela, 1999:1, 5). Some information on agricultural issues is currently available on web sites but can be expanded significantly to increase availability of suitable information to those who need it.

1.7 Sources of information currently available to South African farmers

At present there are a number of sources of agricultural information available to the South African farmer. These sources can be obtained with relative ease. Information is however not always suitable and the information on the World Wide Web is often untested and ephemeral. The prospective producer has to make a judgement as to the applicability and value of information he can find.

Much of the scientific literature is not written for the layman and can be confusing. Information supplied by manufacturers and suppliers of equipment and ingredients, favouring their own equipment or products and does not present a balanced view. Information supplied by advisers may also not be impartial. They can personally favour a certain process, piece of equipment or suppliers. The prospective producer himself should gather as much information as possible to get an objective overview before taking any decisions. This is not always possible, because of limited time available. Farmers are not always aware of possible sources and is often unwilling to read through a lot of information, most of which he cannot understand easily.

Though the accessibility to agricultural innovations to small scale farmers is often limited by unfavourable economic, socio-cultural and institutional conditions, they can achieve some level of efficiency, as result of intuitive knowledge they possess. If provided with the right input, feasible technology and relevant information, they can transform traditional agriculture (Ozowa, 1995:1).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

18

1.7.1   External and internal sources of information

Farmers can utilize both external and internal sources, if they experience a need for information to improve their agricultural practices (Boerdery ..., 1999:1).

External sources of information include the following:

- farming magazines such as *Farmer's Weekly, Landbouweekblad, Agricultural News;*
- farmers' days;
- newspapers;
- circulars by agricultural unions, manufactures and suppliers;
- consultants for specialized assistance and information, such as agricultural engineers;
- producers' organisations such as NAMPO, SAGIS;
- financial institutions such as Land and Agricultural Bank, ABSA;
- scientific journals;
- conference proceedings;
- theses;
- information supplied by agricultural advisers of the Department of Agriculture and Agrelek;
- courses offered by the Agricultural Research Council;
- foreign pamphlets; and
- information leaflets of the National Department of Agriculture and agricultural unions. (Boerdery ..., 1999:1; Jordaan, 1999:48; Van Niekerk, 1993:23).

Farmers often do not have the means to buy sources to stay informed about available information. They should be encouraged to keep abreast of new technologies in as

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

19

many ways as possible and ways should be found to disseminate appropriate information as widely as possible.

Internal sources, providing information on actual practices, experiences and results achieved by the farmer himself, can be invaluable for planning and decision making. Internal sources of information include:

- the farmer's own records, notebooks, journals;

- financial statements; and

- budgets (Boerdery ..., 1999:1).

Although these internal sources are valuable, it is often neglected and ignored. Many farmers still do not have good record keeping systems. Records are kept but not organized for effective retrieval. Farmers rely on memory and intuition for figures and statistics. Farmers should be encouraged and guided to keep records up to date and easy to find.

1.7.2   Information provided by Eskom

Agrelek, as a part of Eskom, supplies information via their advisers about the use of electricity on the farm (Lagrange, 1995:1). All these advisers are computer literate and have access to computers (Lagrange, 1995:2; Lagrange, 1998:1). There are 86 advisers, mostly with a background in electricity.

They handle enquiries about value adding and processing of raw products (Lagrange, 1995:1). They also give advice on the utilisation of energy to ensure effective production (Lagrange, 1995:1). The advisers also visit farmers to give specific advice on problems or prospective ventures.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

20

At present the advisers have access to a database, available through the Eskom Intranet. It contains information on processing methods for various agricultural products. The information in the database is in a linear format, which provides data in a systematic way for finding the optimal plan for a given set of conditions (Upton, 1987:161). This way of presenting data allows for a limited choice, where fixed constraints affect choices in a linear relationship (Upton, 1987:161, 178).

The organization of the database is not very effective. Sometimes as many as thirty different products can be prepared from one kind of raw material. The adviser has to print information on all products or access it linearly on-line. This can be very time consuming.   The interest of the prospective producer can diminish when he or she has to work through a lot of documents. Presenting data in an interactive way, as can be done on the World Wide Web or a CD-ROM, should greatly facilitate the finding of suitable information.

1.7.3   Other informal sources of information

A recent survey done by Marcella & Baxter (1999a:172; 1999b:117) shows a tendency by people to prefer advice of family and friends as a source of information. Only if not satisfied, do they contact other sources such as public libraries, professionals, advice agencies, and others. Users, especially those below the age of 35, however indicated a preference for using a computer to access information as an alternative to help from family and friends (Marcella & Baxter, 1999a:173; Marcella & Baxter, 1999b:117).   The more mature users showed a clear preference for radio, newspapers, and other printed sources for obtaining information (Marcella & Baxter, 1999a:173; Marcella & Baxter, 1999b:119).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

21

1.8 Summary

The farmers in South Africa, and especially the dairy farmers, are faced with a number of challenges, ranging from deregulation of the dairy industry to new labour legislation. They have to adapt by changing their farming practices, as well as considering processing of products on the farm to ensure a steady income. Farmers who are considering making changes, need information before any choices can be made. Various sources of information are available to farmers, both formal and informal. The formal sources of information are fragmented and often not complete or applicable to small and medium scale processing. Agrelek has attempted to render a service by developing a database, which is available on-line to Agrelek advisers only. Farmers who request data are given a printout from the database. It is time consuming to read through this information, which is also not very user friendly. Informal sources of information are also important. As indicated above, many people still prefer word of mouth to scientific information.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

22

1.9 Research problems

Table 1.2 Research problems identified

- The target audience of this web site.
- Information which is currently available to the target group.
- Information needs of the target group.
- Information to be included in the web site to meet the information needs.
- Suitable ways of presenting the information.
- Design of the web site for effective transfer of information.
- Evaluation of the web site.
- Adaptations to the web site after evaluation.
- Future of web based sources aimed at the target group

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

23

1.10 Research questions

Table 1.3 Research questions

Research problems	Research questions
The target audience of this web site.	– Who is the target group of this web site?
Information currently available to the target group	– Which sources of information are currently available? – Is it in a suitable format for farmers?
Information needs of the target group	– What are the information needs of the target group? – Can information seeking models be used to establish the design and development of information retrieval systems? – How can the information seeking behaviour of the target group be described?
Information to be included in the web site to meet information needs	– Which features should ensure that this web site overcome obstacles in meeting the information needs? – What should the guidelines for selection of the content of the web site be? – How can the level at which information should be provided be determined?
Suitable ways of presentation of information	– What is the best delivery medium?
Design of the web site for effective transfer of information	– Which factors should be taken into account when designing a web site?
Evaluation of the web site	– How well is the web site working?
Adaptations to the web site	– Which aspects touched upon by evaluators should be changed in the web site?

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

24

1.11   Limitations of this study

This study was done in conjunction with Agrelek. Much of the information on yoghurt was taken from the Agrelek database. It was not possible to do a needs analysis specifically aimed at the manufacturing of yoghurt on the farm. Information needs were deduced by studying available literature. Yoghurt was identified by Agrelek as a possible application, but no attempt was made to establish whether information on another product would have been more useful.

The development of the web site was also limited by technological considerations. Many farmers do not have computers or Internet access. The availability of suitable hardware was also a limiting factor. Many of the "older" machines, such as 286 SX, are not compatible with some of the newer browsers, software and available web sites. Many of the potential users of this type of web site are also not computer literate.

Another limitation is the language in which the web site is written. English was chosen as the most universal, but might result in making usage difficult for people who only have English as a second language.

1.12   Summary of chapters

Chapter 1:   Introduction

This chapter provides the background to the development of the prototype web site. It gives an overview of current trends in the South African agricultural sector and in the dairy industry in particular. These trends force farmers to find other way of earning money. Many of them consider making products on the farm, using available resources. To be able to do this effectively, they need information. There are a

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

25

number of information sources available to farmers, but it is often not suitable for small to medium scale processing.

With the cooperation of Agrelek, a provider of information to farmers on the effective use of electricity in farming, yoghurt was selected as a product suitable for small to medium scale processing by farmers themselves. The development of this prototype web site and CD-ROM on yoghurt making, can be seen as an attempt to provide appropriate information in a suitable format on one product. If successful, the range can be expanded. The web site is called FARMPRO.

Chapter 2:   Information needs

This chapter provides a theoretical background for determining the information behaviour and information seeking behaviour of farmers. The information needs of farmers are listed as well as aspects on which dairy farmers might need information. A framework for assessing information needs is applied to the information needs of dairy farmers who might be interested in making yoghurt on the farm. Determining their needs is a prerequisite for developing an information resource that will fulfill these needs.

Chapter 3:   Considerations when designing and developing a web site

Before attempting to design a web site, a number of aspects have to be considered. This chapter gives an overview of choices that can be made. A brief look is taken at the suitability of using multimedia and the World Wide Web to make information available to the target group, namely dairy farmers. Structures which can be used for the construction of a web site are discussed and compared in order to select the most suitable. The possible use of HTML and *Dreamweaver* for the construction of a web site is described. The use of an Electronic Performance Support System (EPSS) in

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

26

developing the web site is considered. Due to mostly technological and time constraints, it could however not be used for this particular web site.

All aspects relevant to the design of web site are discussed. It includes matter relating to text design, such as length of lines, formatting, typeface and language to be used. Design of the screen or interface, including arrangement of information on the screen, use of white space, menus, tables, colour, icons and graphics as well as the size of the screen is described in detail. Navigation issues such as the design of the web site as a whole, the home page, the use of links and feedback are also included.

Chapter 4   Development of a prototype web site for making yoghurt

This chapter describes in detail how the actual web site was developed in three phases. After each phase changes and improvements were made. The information included in the web site was also expanded and a few other sites of possible interest to farmers making yoghurt was added.

Chapter 5:   Evaluation of the prototype web site

Chapter 5 describes the summative evaluation after completion of the third development phase. A questionnaire was compiled and a panel of evaluators assembled. These evaluators consisted of food scientists, agricultural engineers, dairy farmers and novices. Experts on design and language usage also made comments on the web site. Overall comments were favourable. Where possible, changes were made to accommodate suggestions made by the evaluators. The final version of the prototype web site was put on a CD-ROM and will eventually be made available on the World Wide Web.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

27

Chapter 6:   Conclusions and recommendations

In Chapter 6 a number of conclusions are drawn and recommendations made. The process of the development of the particular web site made it clear that many improvements can be made in possible future web sites aimed at farmers. It made it possible to come to an understanding of the characteristics and information needs of a particular target group and the best way to meet these needs. Ways have to be found to establish what their needs really are. Content suitable to meet these needs should be supplied. The most suitable way of presenting information should be selected and future web sites should reflect the most effective way of transferring information.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

28

Chapter 2: Information needs

2.1   Introduction

The target audience chosen for this web site is small and medium scale farmers with surplus milk on the farm, which they can process themselves. The web site should give information on making a variety of yoghurt types and provide all information needed for this purpose. It should also be useful to Agrelek advisers who work closely with farmers in planning new ventures. The availability of the information on a CD-ROM, should also make this information available on a wider front if required.

In order to establish specific needs, information and information seeking behaviour as well as models that can be used to explain the information seeking behaviour of different user groups, were considered as a basis for designing a web site as a source of information for dairy farmers. Types of needs were identified, and applied to a framework for assessing information needs.

2.2 Information behaviour

Information behaviour is described by Wilson (1999:259) as:
–   the identification of a need for information;
–   the search for information; and
–   using that information.

A user should therefore become aware that there is a gap in his knowledge that can be filled by obtaining appropriate information. The next step entails finding this

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

29

information. Knowledge is acquired when relevant information is obtained and applied to fill the experienced need.

2.2.1 Information seeking behaviour

Information seeking behaviour can be seen as the actual process of identifying and obtaining the information itself. It varies considerably from one user group to another. People needing information have different approaches when seeking information. Researchers in the natural sciences use completely different methods than those in the social sciences. Novices use different methods than experts (Wilson, 1999:251).

Identification, analysis and coordination of the information needs of users are essential for the planning, implementation and operation of information systems and networks (Prasad et al., 1992:42; Kunz et al., 1976:9). In the design of an information tool, the information seeking behaviour of the target group should be known. In the case of this study the target audience is farmers, who should mostly be novices, and also advisers to farmers, who are experts on the use of electricity, but not necessarily on processing of raw materials. There should therefore not be many differences in their information seeking behaviour.

2.2.2 Application of models of information seeking behaviour to South African dairy farmers

An information behaviour model can be described as a framework for thinking about a problem and may evolve into a statement of the relationships among theoretical propositions (Wilson, 1999:250). Various models exist, such as those of Wilson, Dervins, Ellis, Kuhltau, Saracevic, Ingwersen, Belkin and Spink (Wilson, 1999:252-262).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

30

The above models focus on:

–   behaviours associated with information seeking behaviour; and

–   a broader perspective of the information search as opposed to only the use of computer-based information retrieval systems (Wilson, 1999:258).

These models are often used in the design and development of information retrieval systems. The ideal situation would be if a system could be designed to reduce the risk of failure by the user, and simultaneously increase the users' sense of self-efficacy (Wilson, 1999:258).

The first model discussed and adapted for use in the design of the web site focusses on the relationship between the information seeker, and the channels of communication. The second model focusses on the progress from problem identification to problem resolution.

2.2.2.1   An information seeking and communication model

The focus of this model is on the seeker of known or unknown information. There is also a strong focus on the communicator and the channels of communication. This model shows the general relationship between communication and information seeking behaviour. The communicator as the originator of the message is linked by channels of communication to the person needing the information. There is a feedback loop, through which the communicator learns of the user's response to the communication (Wilson, 1999:264)

This model helps to identify relationships in the information seeking process, which can easily be overlooked and ignored. It is important to realise that the study of some particular topic needs to be done in the context of the surrounding field (Wilson, 1999:264). Information searching should be explored with an understanding of

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

31

information seeking, and the latter with an understanding of general information behaviour of a particular group (Wilson, 1999:264).

If this model is applied to dairy farmers (figure 2.1) it gives an indication of the information needs of farmers within the context of farming. All aspects covered, especially feedback, should be taken into consideration when developing a web site to meet the needs of these farmers. It is apparent that not only the information seeking behaviour and the subsequent information needs should be addressed, but it should be treated as a comprehensive package, addressing all aspect such as: the specific needs of the farmer (small, medium or large scale; equipment, costs, marketing, and others), information to be included, availability of the information, and feedback.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

32

Figure 2.1   **Relationship between information seeking behaviour and communication of dairy farmers (adapted from Wilson, 1999:264)**

	Feedback - e-mail communication with the author - comments on characteristics of content - evaluation of information supplied-		**Communicator** - author of web site - sources used by author
Person in context - dairy farmer	**Intervening variable** - size of operation - costs - cost of the product - equipment, etcetera	**Information seeking behaviour** - looks for information himself - ask Agrelek adviser	**Channels of communication** - published - web-based - CD-ROM
	Processing and use - computer access to CD-ROM - web screen - printed material		

2.2.2.2   *Problem solving as a basis for information seeking and the searching process*

The transition from problem identification to solution is not a simple and straightforward process (Wilson, 1999:265). The farmer wants to solve the problem (what to do) and resolves the problems associated with this problem (how). It involves a change from uncertainty (no information) to certainty (appropriate information)

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

which then becomes a goal. During this transition from uncertainty to certainty (problem resolution) there are identifiable and recognized stages (Figure 2).

Figure 2.2   **A problem solving approach of dairy farmers in the information seeking and searching process (adapted from Wilson, 1999:266)**

| Uncertainty resolution | | Uncertainty resolution | | Uncertainty resolution | |

| **Problem identification**
- farmers want to use surplus milk | → | **Problem definition**
- considers making yoghurt | → | **Problem resolution**
- gathers information on yoghurt making | → | **Solution statement**
- makes yoghurt |
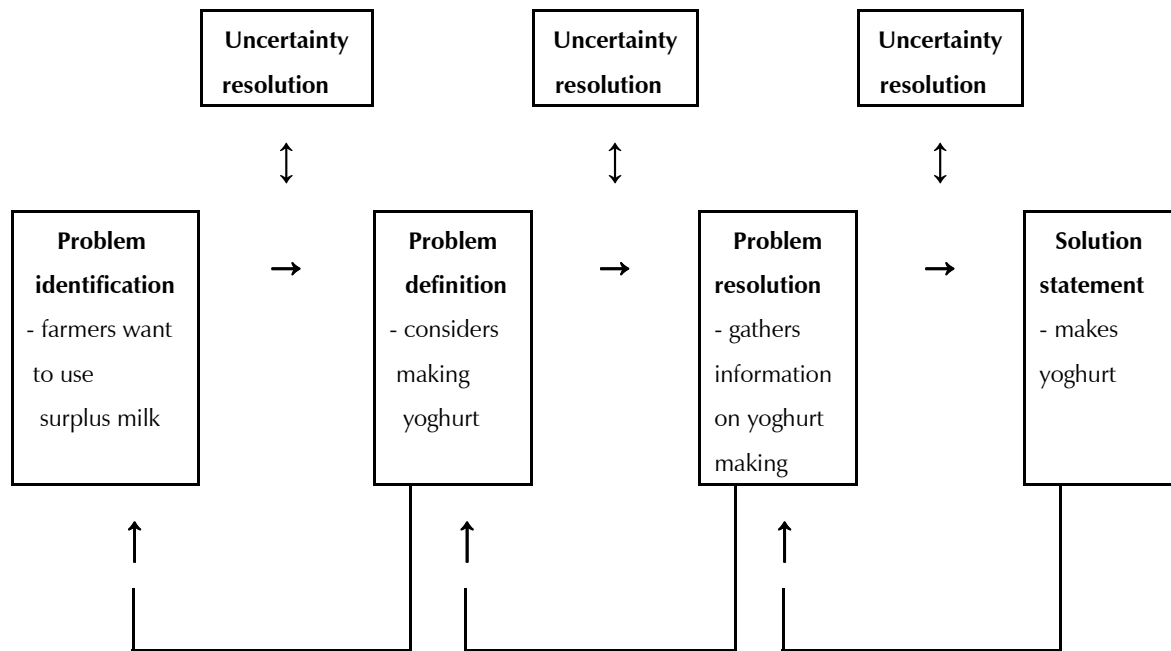
It can be concluded that each stage or step in this process, shows the successive resolution of more and more uncertainty, and should this fail, the feedback loop to the previous stage should be taken to try and resolve the problem (Wilson, 1999:266).

Study of this model indicates the necessity for the development of an interactive web site. It ensures that a user can return to a previous stage to try other possibilities, when uncertainty about a solution is experienced. It however does not allow feedback to the author, a stage that is essential to improvement of the web site.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

34

In the development of any information source, it is essential to know the target audience, to know their characteristics, information seeking behaviour and their information needs.

2.3 Information needs

Debons, as quoted by Kaniki (1992:83), describes a need from a physiological approach, where a need is a state-of-lacking which causes an imbalance in homeostasis (a relative stable equilibrium between elements). This can be removed or reduced by providing information on whatever the need may be.

An information need can, when seen in the context of information seeking behaviour, be defined as:

- patterns or paths pursued by an individual in an attempt to resolve a need; or
- a state of lack of desirable requisite(s) or commodities (information) (Kaniki, 1992:84).

Information needs should be understood and anticipated in order to provide appropriate and applicable information (Kaniki, 1992:88). Information needs relate to:

- what information is needed;
- what can be done to satisfy the need;
- on what level should information be provided; and
- how much detail should be given (Kaniki, 1992:84; Nicholas, 1996:12; Prasad, 1992:6-8; Wilson, 1999:252-262).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

35

Information needs are highly personal and depend on the level of education of the user, the ability to verbalise requests, the willingness to learn, and what is most important, the predisposition to use the information. Criteria for assessing user needs should be established. The data collection methods used to determine the needs of the user have to be effective, reliable and robust (Kunz et al., 1976:9; Nicholas, 1996:4). It is important to determine and evaluate the information needs of a specific group when making a decision about what information should be included or supplied to meet the unique needs of those users (Heckel, 1982:23-26; Kaniki, 1992:84; Kaufman, 1988:21; Klair et al., 1998:3; Kunz et al., 1976:9; Main, 1993:51-60; Nicholas, 1996:2).

2.3.1   Kinds of information needs

Information needs can evolve form one of the three basic human needs, which are:

- ***physiological needs,*** which include the need for food and shelter;
- ***psychological needs,*** which include the need for security and domination; and
- ***cognitive needs,*** which include the need to plan and learn a skill (De Jong & Sarti, 1994:1; Nicholas, 1996:7; Klair et al., 1998:1).

Information needs can also be divided into dormant needs, and unexpressed needs:

- ***dormant needs manifest:***
    - when people are not aware of what they need (Nicholas, 1996:8; Prasad, 1992:1); and
    - when people are unaware of "new" information available which could help and assist them (Nicholas, 1996:8).

Exposure to information, can then lead to an awareness of its worth (Kunz et al., 1976:9; Nicholas, 1996:8).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

36

- ***unexpressed needs are apparent:***
  - when people are aware of needs but do nothing to express this need (cannot or will not) (Nicholas, 1996:8).

When developing an information tool, the abovementioned needs should be anticipated if possible. This can be attempted by making deductions from available information on the information seeking behaviour and the attitude to information of a prospective target group.

2.3.2   Obstacles to meeting information needs

There are various obstacles getting in the way of successfully using information. A person experiencing uncertainty does not recognize his specific need, especially if it is intangible. Because he is unable to specify what he really needs, he is unable to find a way to satisfy this need (Nicholas, 1996:7, 13; Prasad, 1992:15).

There are a number of factors playing a role in successfully meeting information needs. These factors include:

- ***Factors relating to personality:***
  - persistence, willingness to continue and try again if success is not achieved immediately;
  - thoroughness, to search deeply and painstakingly;
  - orderliness, by searching systematically;
  - motivation, leading to commitment, to persist; and
  - receptiveness, which is the willingness to accept information from other sources (Nicholas, 1996:38).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

37

- ***Factors relating to time:***

  - a lack of sufficient time to obtain and digest information in the time allotted for the task (Nicholas, 1996:38).

- ***Factors relating to access:***

  - even if someone knows about the existence of information, it might be difficult to obtain;

  - distance from places where information can be obtained;

  - format and language in which information is available; and

  - people use what is easiest to get and closest to hand, and not what is actually the best or most appropriate (Nicholas, 1996:38).

- ***Factors relating to the lack of resources and excessive costs:***

  - Internet access and on-line uses of information systems are costly (Nicholas, 1996:38).

- ***Factors relating to information overload:***

  - the amount of information can be overpowering. It needs to be evaluated and only the best selected (Nicholas, 1996:38).

When developing an information resource for a specific target group, the influence of the abovementioned factors on information seeking behaviour and the successful use of information should be taken into consideration. It should ensure that the information resource contains appropriate information. The transfer of this information to the user should fit in with his personality traits and should be affordable and accessible to as many people as possible.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

38

2.4 Information needs of South African dairy farmers

When embarking on a new venture, many problems emerge of which the farmer has no knowledge. Before a decision can be made on which product to select, he needs general information on, for example, marketing possibilities and credit available. He also needs more specific information on the actual processes, equipment required and legal requirements (Ozowa, 1995:1).

Information for large scale processing is available for use in factories. It can however seldom be applied to small to medium scale processing as required by farmers (Collaboration, 1999:11; Jordaan, 1999:40; Lagrange, 1995:2; Small-scale, 1999:10).

2.4.1   Levels of information needed

According to Van Niekerk (1993:19), three distinct levels of agricultural information can be identified:

- *the scientific level:* providing information on an international level;
- *the extension level:* providing information of national importance; and
- *the level of trade and industry:* providing information from agribusiness to their markets

Farmers considering processing raw materials themselves, need to take limited note of scientific level, but need to know about information on an extension level and also on the level of trade and industry.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

39

2.4.2   Information needs of groups in the agricultural sector

The agricultural community consists of a variety of groups, each with different needs. These groups are, among other: researchers, educators, government personnel, agricultural associations, agricultural economists, exporters, journalists, bankers, consultants, agricultural librarians and information providers, nutritionists, food scientists and technologists, home economists, farmers, and persons involved in agribusiness (Table 2.1) (Frank, 1987:297). Needs experienced by these groups are diverse and clearly show the different levels of the information needs of each group. The needs of each group are illustrated in the following table:

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

40

Table 2.3   Information needs of various agricultural users as identified by Frank, (1987:299-300)

User population	Information needs
Policy makers / administrators (government and private industry)	Production levels, use of resources, market outlook, state and national outlook (perishable information)
Research scientists; information providers, all segments of agriculture	Research - past, present and future; rapid access to latest findings
Diagnostic, analytical and Industrial scientists and economists	Immediate access to details of new standards, techniques and procedures, patents and product details, trade information, market intelligence and outlook statements
Specialist advisers	Similar to needs of researchers - new developments, and who is doing what, where and when
General advisers: extension personnel, home economists, journalists	Practical information, factual information, current practices, up-to-date information
Educators and students	Current practices and issues, computer literacy and experience in accessing databases
Agricultural service industries - banks, feed and fertilizer suppliers, associations, produce brokers, chemical companies, exporters, economists, etcetera	Market trends, production estimates, prospects for agricultural industries, research results; new practices and government policy; rapid access to new information, data analysis and interpretation
Consumers (farmers, ranchers and rural residents) and general public	Integrated technical and economical information to enable decision making; production, marketing and consumption information, information to manage lives and cope with everyday problems and realise opportunities

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

41

It is clear from the above that no single information source can meet all the listed needs. To be effective, the source should be aimed at a specific target group and its particular needs.

2.4.3   Aspects on which information is needed

Although agricultural information is available, it is often not readily obtainable or in suitable format for all target groups.

The factors influencing South African agriculture and the dairy industry (par 1.2 and 1.3) form the background to decisions farmers have to take and on which they need information. The following are more specific aspects on which farmers need information:

2.4.3.1   Utilization of information

Farmers are often not even aware where information on specific issues can be found. They are also, not aware of the value of information and how it can contribute to success (Baldwin, 1999:2-3; Kaniki, 1992:85; Klair et al.,1998:1-3, 8-11; Letshela, 1999:4; Ozowa, 1992:1-2).

2.4.3.2   Strategic positioning

Farmers have to know how to position themselves strategically. Profit margins are narrow and farmers need to farm more efficiently and also increase the volume of their business. The farmer has to be able to recognize the strengths and weaknesses of his business. He should be able to evaluate all factors which will determine the future direction his business should take (Kaniki, 1992:85; Klair et al., 1998:2; Letshela, 1999:4; Ozowa, 1992:1-2).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

42

It is important to keep up with national and international trends. The competitiveness of the enterprise should also be determined. Accountability of producers, especially environmental accountability is regarded as essential. To achieve this, extension education informs farmers about issues such as using lower levels of chemicals and alternative farming methods to protect the environment (Baldwin, 1999:2-3; Kaniki, 1992:85; Klair et al.,1998:1-3, 8-11; Letshela, 1999:4; Ozowa, 1992:1-2).

2.4.3.3   Financial considerations

It takes money to make money. Farmers have to plan carefully to make sure that they can remain in business. Information on monetary issues is needed. Possible sources of loans, including names of lenders, and the location and types of existing credit sources should also be available. The terms of loans such as interest rates, loanable amount and mode of repayment as well as tax implications are also important (Kaniki, 1992:85; Klair et al.,1998:1-3, 8-11; Ozowa, 1992:1-2).

2.4.3.4   Management

Management is a very important factor in any business venture. Farmers should have information on management options for farmers as well as be able to evaluate his own management capabilities (Baldwin, 1999:2-3; Kaniki, 1992:85; Klair et al.,1998:1-3, 8-11; Letshela, 1999:4; Ozowa, 1992:1-2).

2.4.3.5   Choice of products

Information on which commodities for which there is a demand and what the preference of consumers are, is also invaluable in the choice of products. Some products might also sell better at certain times of the year in and in certain

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

43

communities (Baldwin, 1999:2-3; Kaniki, 1992:85; Klair et al.,1998:1-3, 8-11; Letshela, 1999:4; Ozowa, 1992:1-2).

2.4.3.6   *Planning production*

Production should be planned in conjunction with seasonal changes that might occur. If a product is to be successful, it should be made from the best possible ingredients. Information on forecasts of market trends is needed as well as on estimated electricity, water and other necessary requirements, and ways in which production costs can be reduced (Baldwin, 1999:2-3; Kaniki, 1992:85; Klair et al.,1998:1-3, 8-11; Letshela, 1999:4; Ozowa, 1992:1-2).

The evaluation of new developments and new technologies which might improve production is also necessary to be able to make informed decisions. New technologies are expensive and might still be unproven. It can however contribute significantly to make production more cost effective (Baldwin, 1999:2-3; Kaniki, 1992:85; Klair et al.,1998:1-3, 8-11; Letshela, 1999:4; Ozowa, 1992:1-2).

2.4.3.7   *Legal considerations*

Information on legislation affecting, not only the product itself, but also the production environment, such as factory construction, as well as the workers employed, their working conditions, minimum wages and safety should be available. Before any product is offered for sale, it should conform to all legal requirements. If regulations are not adhered to, producers can face legal proceedings against them (Baldwin, 1999:2-3; Kaniki, 1992:85; Klair et al.,1998:1-3, 8-11; Letshela, 1999:4; Ozowa, 1992:1-2).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

44

2.4.3.8   Quality and safety

Information on food quality and safety and ways of ensuring that no contamination or deterioration of products occur is essential for the success of any enterprise. Good quality is the best advertisement and can ensure the success of a product. Food safety, aimed at protecting consumers is also very important. It is essential that products are labelled correctly and that all sanitary requirements are met (Klair et al.,1998:1-3, 8-11; Letshela, 1999:4).

2.4.3.9   Pricing

Information on current prices of similar products is needed to ensure competitiveness in the market. If production costs are too high, it will not be cost effective to make a particular product. Information on the calculation of prices is also needed to ensure that a profit can be made (Baldwin, 1999:2-3; Kaniki, 1992:85; Klair et al.,1998:1-3, 8-11; Letshela, 1999:4; Ozowa, 1992: 1-2).

2.4.3.10   Marketing

Information on sales timing assists farmers in ensuring that they market their products at the best possible time, when the demand is high. This information enables them to stagger harvesting and quantity, ensuring profit. Information on marketing practices includes information on improved harvesting methods ensuring that raw materials are not spoiled or contaminated before processing. It also results in better quality products (Klair et al.,1998:1-3, 8-11).

Information on group marketing, can enable small scale farmers to have organised sales of marketable surplus and bulk transport of produce either alone, or in

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

45

relationships with partners (Baldwin, 1999:2-3; Kaniki, 1992:85; Klair et al.,1998:1-3, 8-11; Letshela, 1999:4; Ozowa, 1992:1-2).

2.4.3.11   Evaluation

To ensure quality, safety and cost-effectiveness it is essential to monitor processes and products on an ongoing basis. Information on performance monitoring, the frequency of monitoring and the ability to make quick adjustments should be available (Baldwin, 1999:2-3; Kaniki, 1992:85; Klair et al.,1998:1-3, 8-11; Letshela, 1999:4; Ozowa, 1992:1-2).

All the abovementioned factors are of major importance for farmers in general, but can also be applied to dairy farmers. No farmer can survive or make profit without using applicable information on all aspects of his enterprises. Farming is a business and should be conducted as such. It is not possible to make the correct decision if it is not based on relevant, authoritative and up to date information.

2.4.4   Framework for assessing information needs of dairy farmers

When developing a web site, all aspects that might have an influence on providing a successful information resource have to be considered. The information needs of the envisaged target audience are of paramount importance in this regard. A framework for assessing information needs of dairy farmers wanting to produce yoghurt on the farm, was derived from the following sources: Catsberg & Kempen-van Dommelen, (1990:13-35); Dairy Handbook, (1995:1-330); Fellows, (1988:130-148, 159-186, 210-250, 357-398, 421-461); Kunz et al., (1976:20-41); Light, (1989:1, 87-95, 122-128, 155-157);   Nicholas, (1996:12-33); Nickerson & Ronsivalli, (1982:135-204, 225-252); Potter & Hotchkiss, (1995:69-90, 138-199, 264-315); Raiken, Kill & Baker (ed.), (1998:75-138, 499-556); Rosenthal, (1991:1-410); Rothwell (ed.),

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

46

(1989:1-256); South Africa - Foodstuffs, Cosmetics and Disinfectants Act (No 54 of 1972) and regulations; South Africa - Agricultural Products Standards Act (No 119 of 1990) and regulations; and Tamime & Robinson, (1985:1-350).

In the discussion, information from the abovementioned sources, are adapted to apply specifically to yoghurt making. The framework used, discusses characteristics and aspects of information needs, which have to be included in an information resource. The framework consists of the following:

- subject;
- subject specification;
- function;
- nature;
- intellectual level;
- viewpoint;
- quantity;
- quality;
- date;
- speed of delivery;
- place; and
- processing of information.

2.4.4.1   Subject

This is the obvious and immediate characteristic and aspect to be included, also how many subjects are involved. The specificity or depth of interest (general, selective or contextual) needs to be known to decide how much information needs to be included.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

47

- ***Information needs related to the subject to be covered (general definition of yoghurt)***

    Yoghurt is the product obtained from pasteurised milk or reconstituted milk, which has been inoculated with a yoghurt culture, _Streptococcus_ _thermophiles_ and _Lactobacillus bulgaricus_, and which is allowed to ferment under controlled conditions. It has a characteristic flavour and texture.

2.4.4.2   Subject specification

Subject descriptions should not be vague or a generalisation, because users need to find specific information quickly.

- ***Information needs related to specific subject description (specific information on yoghurt making)***

    Various types of yoghurt can be prepared. According to legislation, yoghurt should have a clean and characteristic flavour, be free of any substance that does not naturally form a part of milk. Yoghurt should be manufactured mainly from milk and reconstituted milk, should after pasteurization be fermented with a yoghurt culture and contain a great number of viable yoghurt type microorganisms. Yoghurt produced in South Africa should comply with the standards as set out in the Regulations relating to Dairy Products and Imitation Dairy Products R 2581 of 20 November 1987, as amended by R 1059 of 3 June 1988; R 2141 of 6 October 1989 and R 1465 of 26 August 1994 and Regulations relating to Milk and Diary Products R 1555 of 21 November 1997.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

48

For the purposes of this web site, production of the following yoghurt types is covered:

- Set yoghurt – Low fat and fat free;

- Set yoghurt – high and full fat;

- Stirred yoghurt – low fat and fat free;

- Stirred yoghurt – high and full fat;

- Long life yoghurt dessert – set;

- Long life yoghurt dessert – stirred;

- Drinking yoghurt; and

- Frozen yoghurt.

2.4.4.3   Function

Users utilise information in different ways and use information for five broad functions, each leading to different solutions. These functions are:

- **fact-finding** : needs answers to a specific question which is a precise need which is well defined and is met by facts or statistics;

- **current awareness** : needed to keep-up-to date, and can be a vague statement;

- **research** : needed when researching a new field for in-depth information;

- **briefing/background** : needs information on topics with which the user is familiar with but wants to know the detail; also background information on broad subject areas; and

- **stimulus** : the user does not necessarily know what he or she is looking for but wants to sound out ideas; the need is unfocussed and unstructured.

For yoghurt making the following information should be included to meet needs under the five functions above.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

49

- ***Information needs related to function regarding yoghurt making***

  - Information relating to function is divided into:
    - general information on yoghurt making;
    - headings used in the web site; and
    - specific aspects of yoghurt making.

  - ***General information on yoghurt making***
    - Information should be updated regularly.
    - The web site should be comprehensive, covering all aspects of yoghurt making.
    - It should include a brief summary or overview of the process and a flow diagram which can lead the user to more detailed information.
    - It should describe the different types of yoghurt that can be made both on small and medium scale.
    - It should be specific and applicable to yoghurt manufacture only.
    - It should include some general information useful to farmers.

  - ***Headings used in the web site***: The web site on processing of yoghurt should provide information under the following general headings, applicable to all products included in the web site:
    - product description;
    - legal requirements;
    - ingredients;
    - processes;
    - equipment;
    - packaging;
    - storage / shelf-life;
    - energy requirements;

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

50

- marketing and pricing; and

- suppliers.

- ***Specific aspects of yoghurt making:*** Under the heading Processes in the previous list the following subdivisions should be used:

  - product description;

  - clarification;

  - separation (low fat and fat free);

  - standardization;

  - fortification of the milk solids;

  - homogenization;

  - pasteurization/heat treatment;

  - cooling;

  - inoculation;

  - flavour addition;

  - fermentation;

  - stirring; and

  - freezing.

2.4.4.4   Nature

The nature of the information itself can be one of the following:

- theoretical;

- historical;

- descriptive;

- statistical; and

- methodological.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

51

- ***Information needs related to nature of the information on yoghurt making:***

  - The information should be theoretically based with practical applications suitable for both small and medium scale processing.
  - Legal requirements referring to composition, labelling, and other requirements should be correct and up-to-date.
  - Information on suppliers of processing equipment, packaging material and processing aids should be included.

2.4.4.5   Intellectual level

The intellectual level on which information is provided refers to the minimum level of knowledge, expertise or level of intelligence required to understand the information.

- ***Information needs related to the minimum level of knowledge required when making yoghurt using a web site or CD-ROM***

  - Users should be computer literate.
  - Users should be able to read and understand English.
  - Language should be simple and easy to understand.
  - Information should not be too technical.

2.4.4.6   Viewpoint

Information can be presented from different viewpoints, approaches or angles. Viewpoints can be categorized as:

  - schools of thought, such as structuralism;

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

52

- political orientation, referring to the disposition towards reading information sympathetic to their own political allegiance;
- positive/negative approaches to the presentation of information;
- subject orientation, especially in interdisciplinary fields; and
- objectivity.

- ***Information needs related to viewpoint on yoghurt making***

  - Information given in the web site should not reflect any specific viewpoint, approach or angle, for example promoting the interests of Agrelek.
  - Information should be positive, with no negative comments on any aspect.
  - Information should be given from an interdisciplinary viewpoint combining information from food technology, food production, food processing and agricultural engineering.
  - Information should be objective and not give preference to a specific kind of yoghurt, process or equipment.

2.4.4.7   Quantity

Users need different quantities of information for different applications. A huge amount of information is available, but is needed in a format suitable for the target audience.

- ***Information needs related to amount of information needed to make yoghurt on the farm***

  - The information included should be a single and comprehensive source of information on all aspects of processing and manufacture of yoghurt.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

53

- Information should be detailed enough to ensure effective use and application.

2.4.4.8   Quality

The perceived authority of the sender or source of information is often the principal indication of the quality that can be expected. Information generated by some organisations is regarded as authoritative, due to among others, their economical or political power, their known expertise, and importance in a particular field.

- ***Information needs related to quality of the information required to make yoghurt***

  - The information should be correct, authoritative and contain explanations where necessary.
  - It should be possible to validate information using other sources.
  - The person or organization providing the information should be known to be knowledgeable and reliable.

2.4.4.9   Date

Users usually need the latest information available.

- ***Information needs related to up-to-date information on yoghurt making***

  - The information included should be based on basic resources but also include the latest information.
  - Information should be updated at regular intervals.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

54

- Information should be given regarding the newest processes and equipment, as well as most recent legal requirements.

2.4.4.10   Speed of delivery

Information can be delivered using different media such as full-text, on-line services, electronic document delivery and fax on demand. Users usually need information immediately.

- ***Information on yoghurt making related to speed of delivery***

  - Users with Internet access should have immediate delivery of the information they need.
  - The e-mail address of the author of the web site should get a quick response.
  - Obtaining the CD-ROM and also possibly a print copy, should take longer but is also possible by return of post.

2.4.4.11   Place

The place in which the information originated can also have an influence on its usefulness.

  - Examples are that information from the USA is universally held in high esteem and information from the Third World is either disregarded or not rated highly.
  - Academics are often more critical than practitioners, and might distrust information not emanating from an acknowledged authority.
  - The language used in the information might not be understood by the user.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

55

- ***Information needs related to origin of the information on yoghurt making***

  - Dairy farmers need information they can use and although information from elsewhere in the world can be useful, it should be integrated and adapted with South African conditions and needs in mind.
  - The web site should not be evaluated only by academics, because they are not the target audience.
  - The language used should be within the range of understanding of the target group.

2.4.4.12   Processing of information

This refers to the ways in which information can be presented, or the format in which it should be made available. It can be popularised, interpreted, translated, reviewed, abstracted, or can consist of executive summaries.

- ***Information needs related to the processing of information on yoghurt making***

  - The web site should include an introductory summary, site map, and flow diagram of processes, but the information itself should be complete.
  - Information should be given in an interpreted and integrated format.
  - Information obtained from sources in other languages should be translated into the language of the target audience

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

56

2.5 Summary

Taking all the aspects covered in this chapter into consideration it is clear that a number of issues have to be carefully evaluated before a suitable resource tool can be created.

2.5.1   Information needs

The determination of information needs is only one aspect of the information behaviour of users. This study should concentrate on farmers and advisers, and only those needs should be taken into consideration when evaluating the information needs of dairy farmers in South Africa. In this chapter an attempt should be made to determine the specific information needs of dairy farmers who want to manufacture yoghurt. Models of information behaviour and problem solving should be evaluated to establish relevance for developing the web site. These together with the specific information needs should be taken into consideration during the design phase.

Various kinds of information needs can be distinguished, and should be kept in mind when trying to fulfil theses needs. The need to obtain knowledge should be provided for, but dormant and unexpressed needs should be anticipated.

2.5.2   Information seeking behaviour of the target group

Using two models of information seeking behaviour, it became clear that elements from the models should be considered when developing a web site. These elements are communication, of which feedback forms an important component. The user communicates with information in the web site, but also needs to be able to contact other sources or people for more information or to gain clarity on some points. The

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

57

user should be able to return to previous screens to control facts. Only then can he move from a state of uncertainty to certainty.

2.5.3 Obstacles to meeting information needs

The obstacles to meeting the information needs of farmers should be overcome as far as possible ensure the usefulness of the web site by as wide an audience as possible. Some of the obstacles are inherent in people and cannot be changed. If these inherent obstacles are kept in mind when designing the web site, information should be presented in such a way to minimise the effects of personality traits. The web site should attempt to satisfy the needs of as broad a spectrum of users as possible, but no single web site will satisfy all users. An attempt should be made to overcome the other obstacles relating to time, access, resources and information overload.

2.5.4 Content of the web site

The content of the web site should be specified. The content should be factually correct, but formulated in such a way to be understood by novices. When deciding on the content, a balance should be achieved between the basic and scientific level of information. While factually correct, it should be written in such a way as to be easily understood by most users.

Information should be provided on an extension level, giving information on local markets, requirements, legislation, safety requirements, business plans, where equipment can be obtained and also where advice can be found.

Information on trade and industry levels are often the property of the various organizations, for example: agricultural unions and producer organizations, which are

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

58

only available to members. This information should also be made available to users of the web site as far as possible.

2.5.5   Availability of the web site

The availability of this web site, both on the World Wide Web and as a CD-ROM should make it possible to reach a wide target audience, those with and without Internet access. This web site should be aimed mainly at the novice user, making it easy to use with no previous knowledge of multimedia or web sites. The information provided should be in short manageable units to minimise information overload. Information should also be complete enough to also satisfy more experienced users.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

59

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:

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

60

- 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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

61

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

62

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

63

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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

64

- 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:

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

65

- 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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

66

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

67

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 bandwith 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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

68

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:

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

69

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.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

70

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)

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

71

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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

72

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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

73

Figure 3.1 The major categories of web use

Copyright Lynch & Horton, 1997. Yale University. http://info.med.yale.edu/caim/manual/
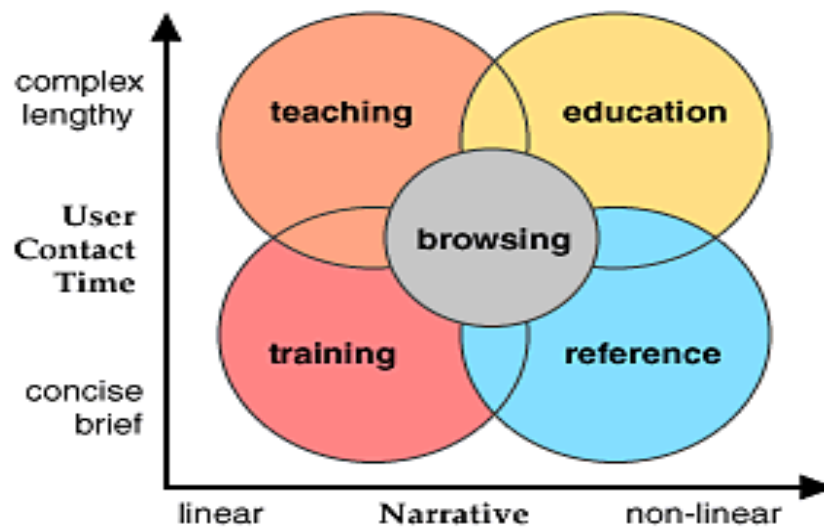
3.5.4.1   *Using the web for training*

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.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

74

- 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.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

75

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

76

- 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 ±50% and *Internet Explorer* by ±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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

77

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)

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

78

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)

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

79
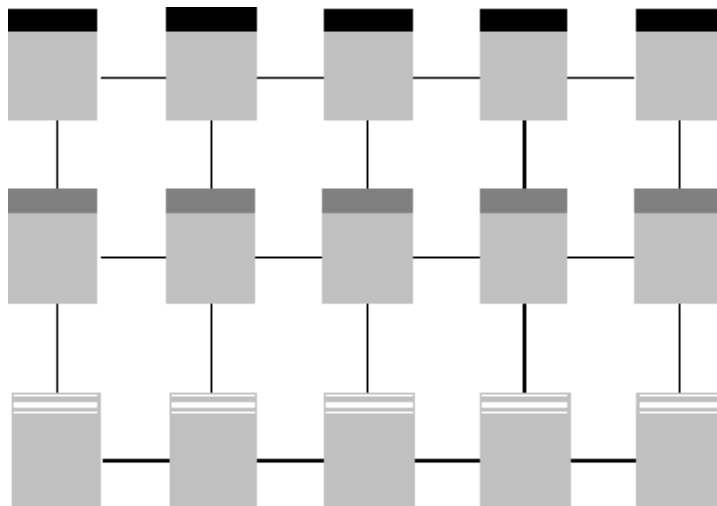
3.5.6.3   *Hierarchical structure*

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)

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

80
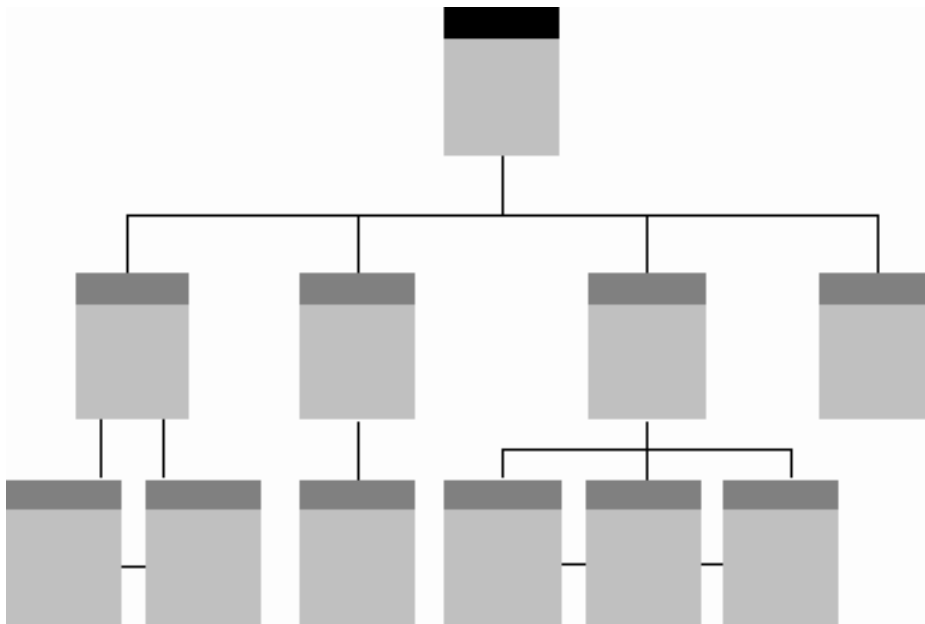
3.5.6.4   Web structure

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)

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

81
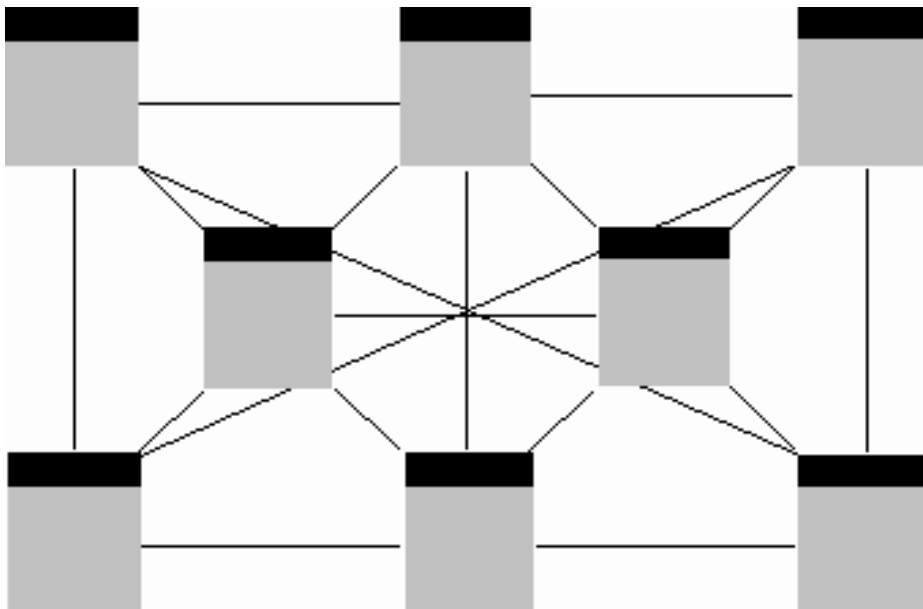
3.5.6.5   Empirical structure

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)

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

82
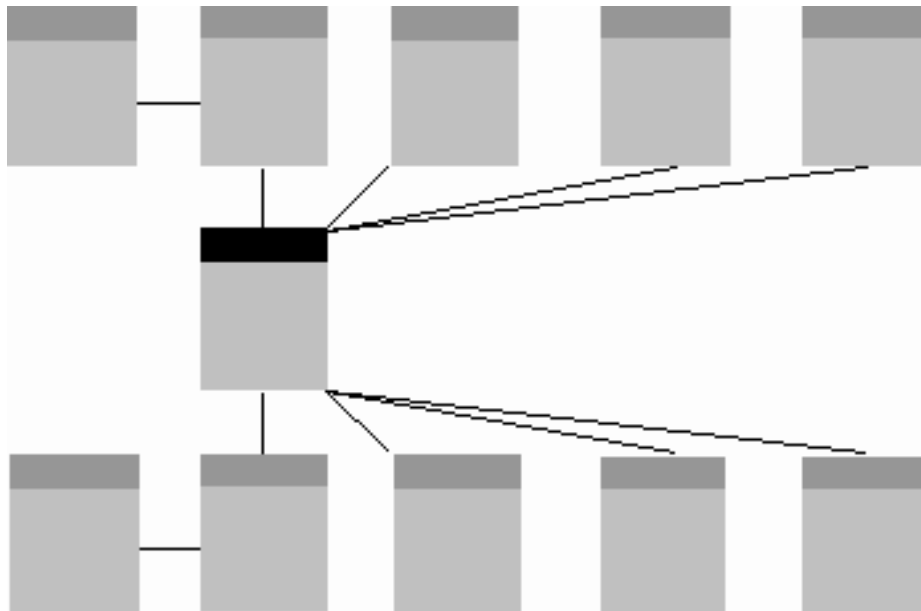
The structures are represented in the following comparative diagram:

Figure 3.7 A summary of all the basic information structures
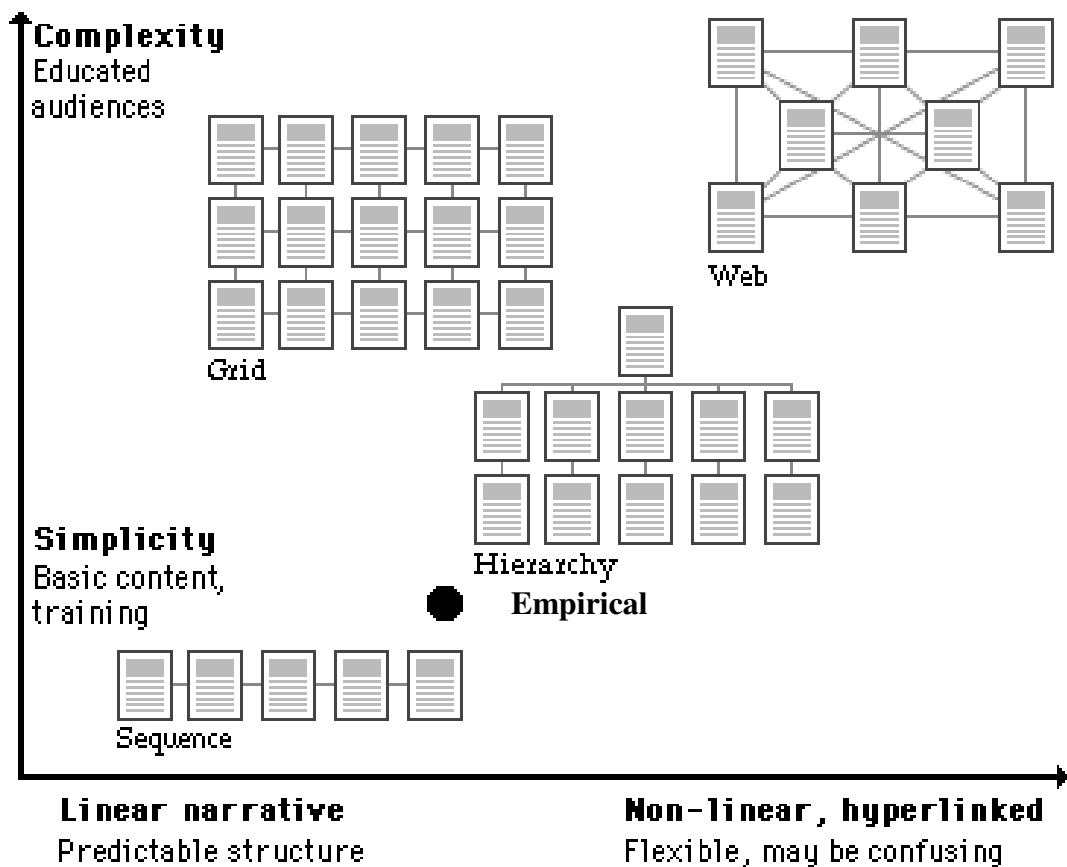
(Remmers, 1998:23; Lynch & Horton, 1997:3)

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

83

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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

84

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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

85

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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

86

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

87

- 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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

88

- *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

  - *BBEdit*.   (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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

89

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^{TM}*

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

90

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

91

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.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

92

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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

93

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

94

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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

95

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 wor*k (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;

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

96

- 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.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

97

- 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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

98

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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

99

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,

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

100

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

101

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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

102

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;

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

103

- 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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

104

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	- 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	- 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	- 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.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

105

- **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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

106

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

107

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
• procedures • policies • concepts • explanations • specifications • glossaries • commands	• pictures • schematics • diagrams • graphics • maps • video	• sounds • music

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

108

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.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

109

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	✗	✓	✓	✓
Used on the job, in simulations, or other practice	✓	✓	✓	✓
Controlled by the worker	✗	✓	✓	✓
Reduce the need for prior training in order to accomplish the task	✗		✓	✓
Easily updated	✗	✓	✓	✓
Fast access to specific, task-related information on demand	✗	✗	✓	✓
Irrelevant information excluded	✗	✗	✓	✓
Allow for different levels of user knowledge	✓	✗	✓	✓
Allow for different learning styles	✓	✗	✗	✓
Integrate information, advice, and instruction	✗	✗	✗	✓
Instructor / Author controlled	✓	✗	✓	✗
Linear	✓	✓	✓	✗
Software driven	✗	✓	✗	✓
Modular	✓	✗	✓	✗
Interactive	✓	✓	✗	✓

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

110

Although most of the above methods can be used for instruction, only EPSS provides or encompasses the full range or 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.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

111

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 that 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.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

112

- 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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

113

browser preference. *Netscape Navigator* includes a <FONT FACE> 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 mut be carefully formulated and edited, to ensure optimal understandability.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

114

- 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;

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

115

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.

Heléne Coetzee - 2000　　The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

116

- 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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

117

Figure 3.8 Visual scanning and screen structure
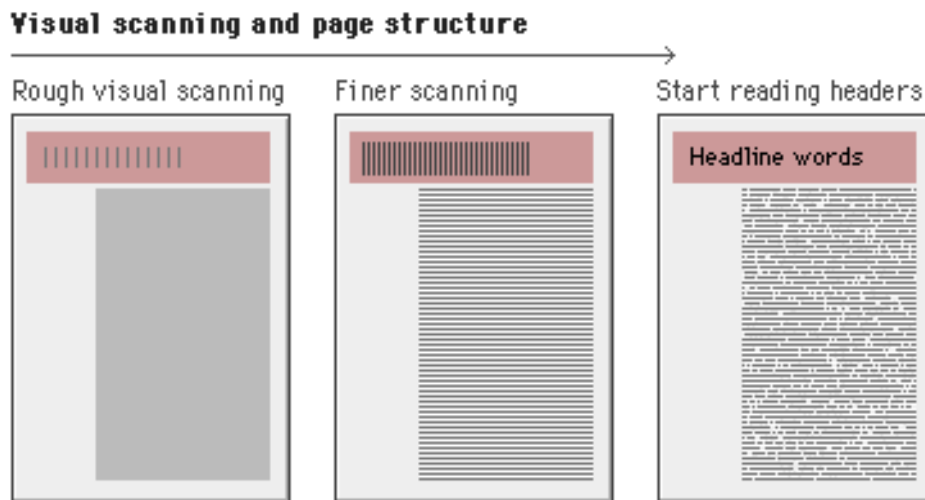
3.10.2.2   *Use of white space*

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

118

(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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

119

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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

120

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

121

- 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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

122

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 decorational 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 lossles 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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

123

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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

124

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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

125

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

Copyright Lynch & Horton, 1997. Yale University. http://info.med.yale.edu/caim/manual/
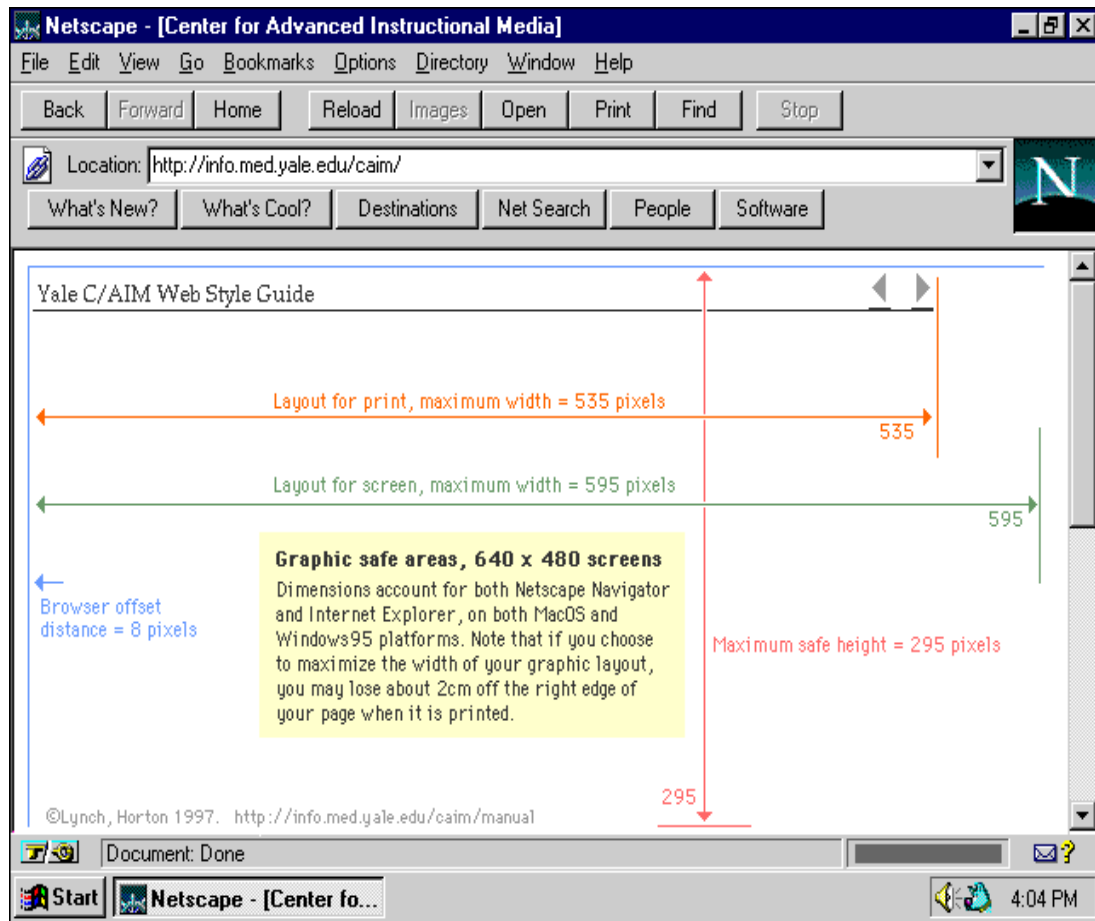
3.10.2.11 What to avoid in screen design

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.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

126

- 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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

127

(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 <u>activate</u> or <u>click here</u>

  (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).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

128

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; Dobrovolny, 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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

129

(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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

130

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.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

131

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

132

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

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

133

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.

Chapter 4   Development of a prototype web site for making yoghurt

4.1 Introduction

The previous chapter was based on a detailed literature review of all aspects playing a role in the development of a web site. For the development of this particular web site, a selection was made from the available literature. Developing a web site is a time-consuming effort. Due to a number of limitations, imposed by available time and technology, the ideal web site, as described in the literature, could not be developed. It was decided to develop a prototype web site, which can be adapted and changed during the development process. When developing future web sites, aspects needing improvement could be included.

To achieve this aim, aspect such as the best possible of way of transferring information, suitable contents, text design, screen design and navigation have to be adapted form available information, for application in a web site.

4.2 Phases in the development of the prototype web site

Based on the literature review in the previous chapter, initial decisions were made for implementation in the development. Decisions on text design, screen design and navigation were made. The following important information was gathered which forms the framework for decisions taken:

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

135

Table 4.1   Content considerations for the web site

The target audience was identified	**Dairy farmers in South Africa**
The purpose of this web site was defined	**The supply of information on the manufacture of yoghurt to small and medium scale farmers on the farm.**
A concise outline of information to be included was given (details on CD-ROM)	**Yoghurt types** to be covered were selected: set yoghurt – low fat, fat free, high and full fat, stirred yoghurt – low fat, fat free, high and full fat, long life yoghurt dessert – set and stirred, drinking yoghurt and frozen yoghurt. **General headings** of information were chosen: product description, legal requirements, processes, energy requirements and suppliers. **Specific aspects of yoghurt processing** covered by the web site were identified: clarification, separation, standardization, fortification, homogenization, pasteurization, cooling, inoculation, flavour addition and fermentation.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

136

- ***Decisions on text design***

  - Brief paragraphs should be used.

  - One idea per paragraph should be given.

  - Text lines should be not more than 40-60 characters where possible.

  - Left justification should be used.

  - Bold should be used for emphasis.

  - Microorganism names should be indicated by using italics.

  - Underlining should show identification of links.

  - Bulleted lists should be used.

  - Black typeface letters should be used.

  - Links should include the word <u>click here</u> to accommodate novice users.

  - Sans serif Arial font should be used.

  - Different letter sizes should indicate hierarchy.

  - Language used should be familiar to the user.

  - Some scrolling for screens with much information should be used.

- ***Screen***

  - Different colours should be used to indicate different aspects (title and menus).

  - Some "fun" graphics should be included to maintain the interest of the user.

  - A clear and simple interface should be selected.

  - White space should be used (the 25-40% of screen not devoted to text or graphics).

  - Title of the screen should appear in the top centre.

  - Display should be regular and consistent.

  - Title of the screen should be given on each screen.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

137

- An overview of important information (definitions) should be supplied in the top 10 cm of screen.

- Menus should appear on the edge on the lefthand side of the screen.

- The colour of the menu should contrast with other colours used.

- Menus with a vertical layout should be used.

- Colour should be used to emphasize certain information.

- Icons should represent a single concept (e-mail and home).

- Icons should be used consistently throughout site.

- Graphics with ALT tags with minimum size should be used to reduce downloading time.

- Hotspots should appear on graphics as links to information.

- Both GIF and JPEG images should be used.

- Screen size should be chosen to ensure the printability of text (650 x 420 pixels).

- *Navigation*

  - Consistent design should be used throughout site.

  - The home page should provide the entry point to site.

  - Labels of links should be unambiguous.

  - Links should be in a contrasting colour.

  - Links should change colour visibly when visited.

  - Link to the home page should appear on every screen.

4.3   First phase in the development of the prototype web site

The first phase in the development of the web site was mainly experimental. Colours and graphics selected to create the "look and feel" were also experimental. It was

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

138

accepted that it would probably be changed after evaluation. Limited information on yoghurt making was also included, with the intention of expanding this later.

4.3.1 Design of the home page

The home page contained only the title and a brief description of the web site (figure 4.1). The background colour selected was yellow, which was a web safe colour. Almost no icons were used.

Figure 4.1 Home page of first phase design

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

139
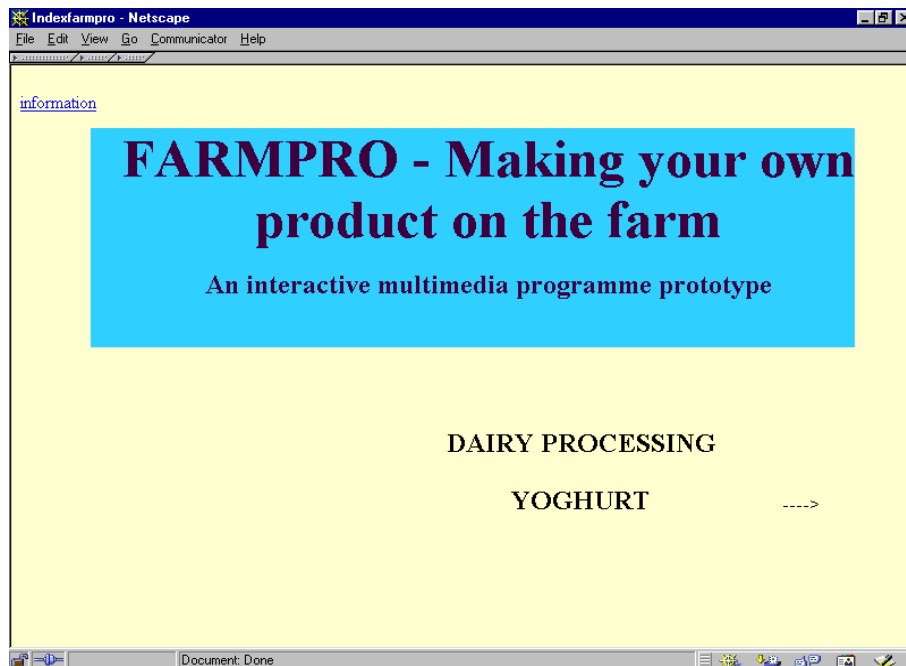
4.3.2   Introductory screen of the first phase design

Small animations were included in the top left hand corner (figure 4.4). The menus consisted of active links which gave access to other screens with detailed information (types of yoghurt, processing methods, etcetera) (figure 4.4). Too much information was given on one screen, which necessitated scrolling. The processing graphics were full screen versions which took a long time to download.

Figure 4.2   Introduction screen of first phase design

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

140
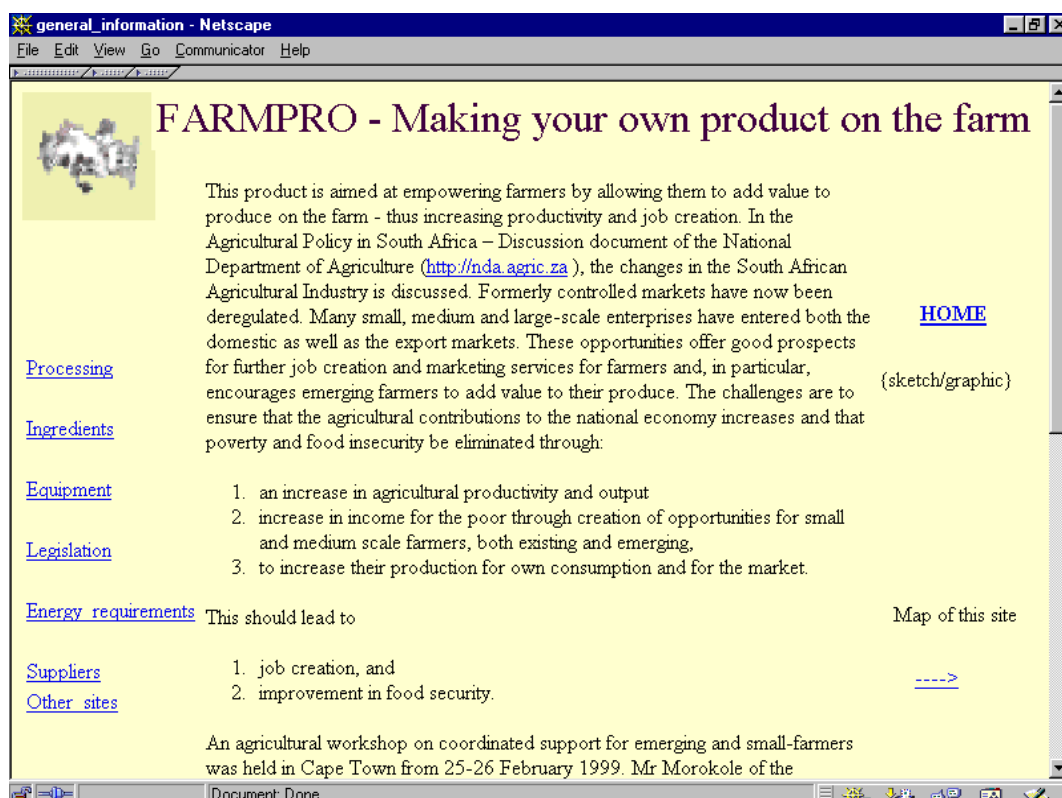
4.3.3   Evaluation of the first phase

The first phase was not formally evaluated. Comments from classmates and someone from Agrelek were general in nature. The following comments were received:

- Too much information was given on some screens (fig 4.2).
- Animations took too long to download.
- Animations were distracting and did not work on all browsers.
- Use of menus was time consuming, because users first had to open a new screen to get access to information.
- Processing graphics took too long to download.

At this stage, the web site was still in a very rudimentary form and much still had to be done.

4.4   Second phase of the development of the prototype web site

The design and evaluation of the first phase were used as a basis for the second phase. The author of the web site also gradually became more proficient, and improvements and changes were made continuously during the further development. The second phase changes included the following:

4.4.1   Changes to the home page

- A more user friendly look and feel was introduced (figure 4.3).
- The home page was changed to contain more information about:
  - at whom the web site was aimed;
  - how to use the web site; and
  - listing the benefits of using this web site.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

141

- The home page was changed to lead users to other screens.

- the home page was changed (fig 4.3) to a blue background with the WHO, WHY, WHAT questions imposed on the graphic which represented a puddle of milk or yoghurt.

- Active links were introduced with a brief description at the bottom of the screen, leading to other screens.

Figure 4.3 Graphic used as background for the second phase home page
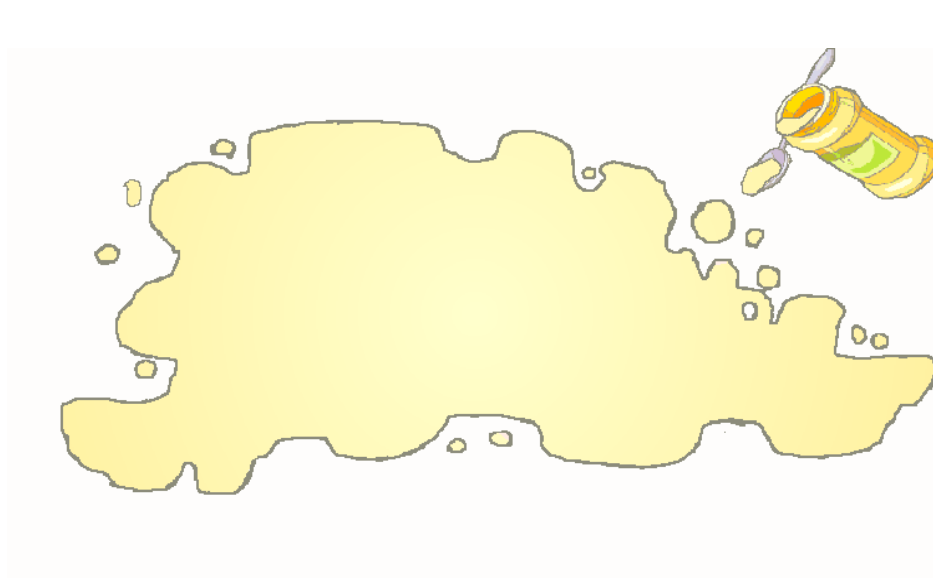
4.4.2   Screen design in the second phase

The menus were changed to include general headings, such as various types of yoghurt and individual processes (figure 4.4). The menus contained a detailed list of the contents (figure 4.4). Menus were highlighted by the use of a darker yellow background (figure 4.4). The text and title appeared in a column with a light yellow background.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

142

A clear distinction was made between different components of the screen: text, menu and titles. Screens were adapted where possible to contain information which could fit on one screen, by using bulleted lists. Other sites of interest to dairy farmers, such as information about banks and weather reports were included. A more user friendly look and feel was introduced.

Figure 4.4 Second phase screen design with separate menus
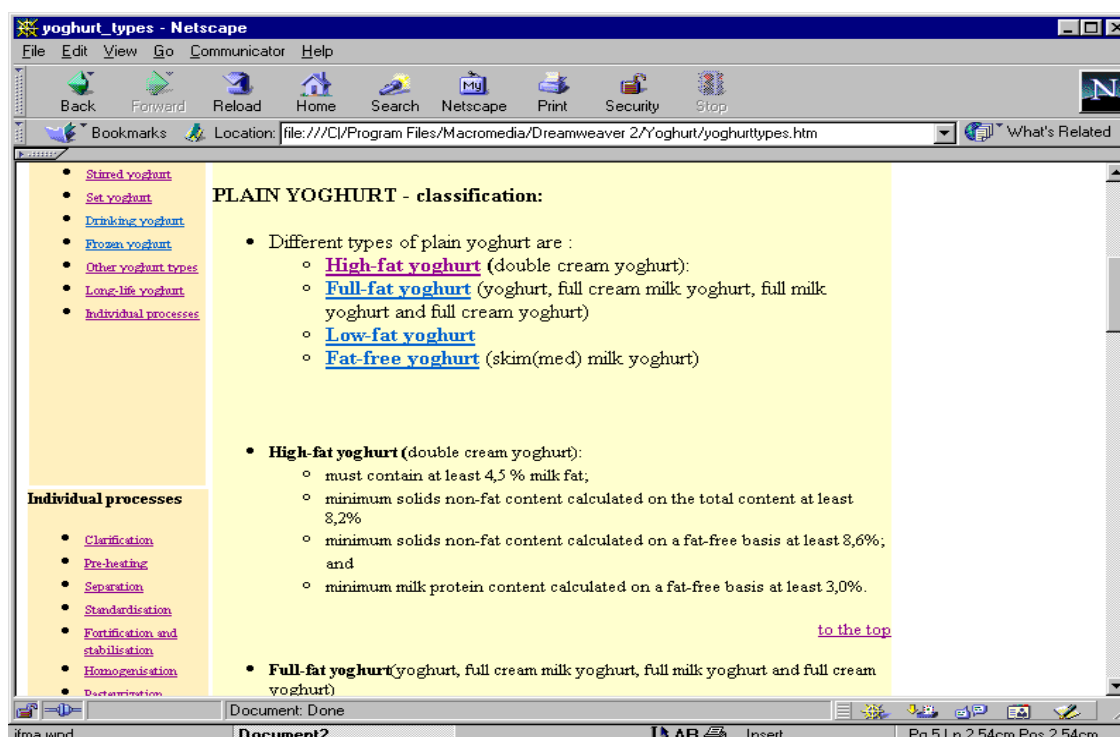
4.4.3   The use of icons

The right-hand part of screen had a white background on which the following icons appeared:

- home ;
- e-mail ; and
- arrows and other icons were introduced as required (figure 4.5).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

143

Figure 4.5 Second phase screen with an indication of arrows and graphics used
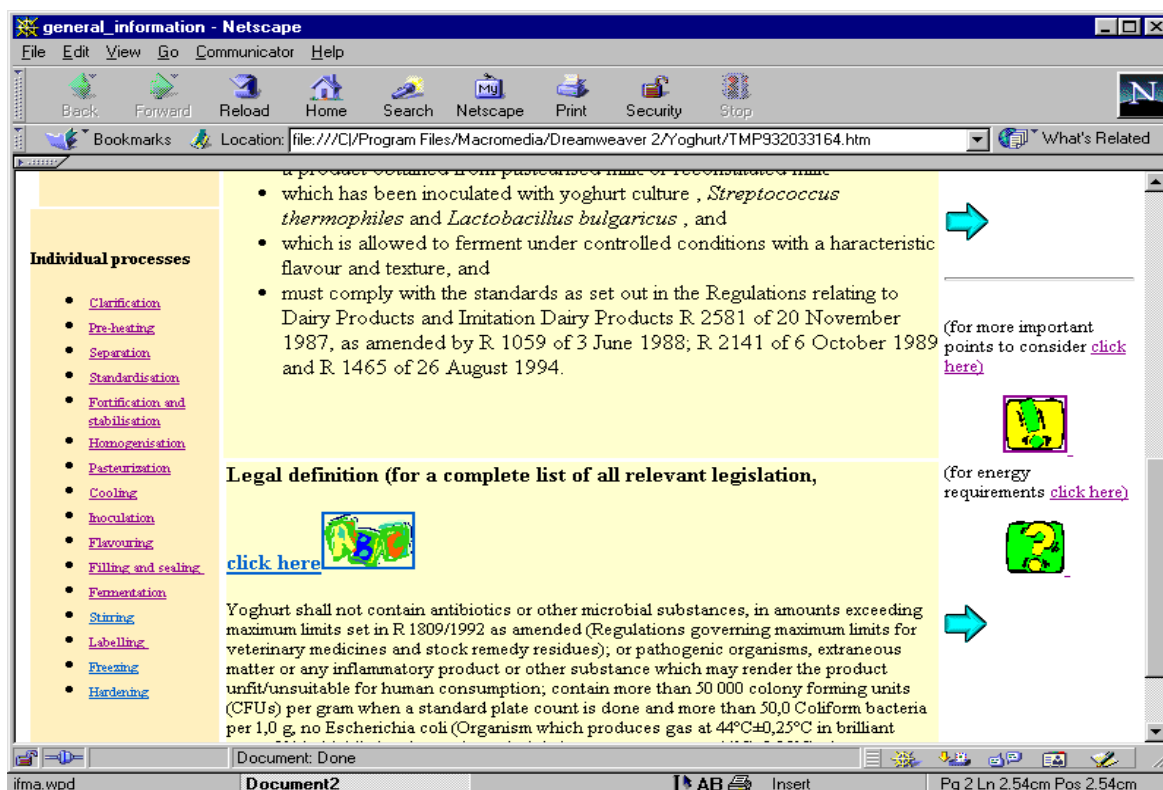
4.4.4   Evaluation of the second phase

The second phase was again evaluated by classmates and someone from Agrelek. Comments were still very general in nature and the content itself was not evaluated. Comments concentrated mainly on "look and feel" and navigation problems. The following comments were made:

- The home page and some of the other screens contained too much information.

- The three menus present on each screen sometimes extended beyond one screen.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

144

- Problems were experienced when the screens were printed. The yellow background of the text came out as dots on the printed version, reducing legibility.
- The text still contained too many links.
- The screen size was perceived as a problem, because some screens of 840x600 only contained 2-3 lines of text.
- The titles on the screens were too general and not indicative of the content.

4.5 Third phase of the development of the prototype web site

After consideration of the abovementioned comments the following adaptions and changes were made:

4.5.1 Changes to the home page of the third phase

The home page was simplified (figure 4.6) with a new graphic and colour.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

145

Figure 4.6 Home page of third phase design

4.5.2 Changes to the introductory screens of the third phase design

Different introductory screens were prepared for different browsers (browsers 3 and lower, and browsers 4 and higher). After the initial screen, the web site selected the browser and opened the particular screen. Users could then select from the alternatives for Quick tour or Complete picture (figure 4.7).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

146

Figure 4.7 Introductory screen of the third phase design

4.5.3 Screen design of the third phase

More detailed information was included in the titles appearing on screens (figure 4.8). Menus were combined and the background colour of the text was changed to white (figure 4.8).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

147

Figure 4.8 First screen of Complete picture of the third phase design

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

148

4.5.4   Business plan

A button at the bottom of the first screen (figure 4.8) gave access to guidelines for compiling a business plan (figure 4.9). The business plan opened in a small screen overlaid on the current screen (figure 4.9).

Figure 4.9 Business plan screen overlaid on the introductory screen of the third phase design

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

149
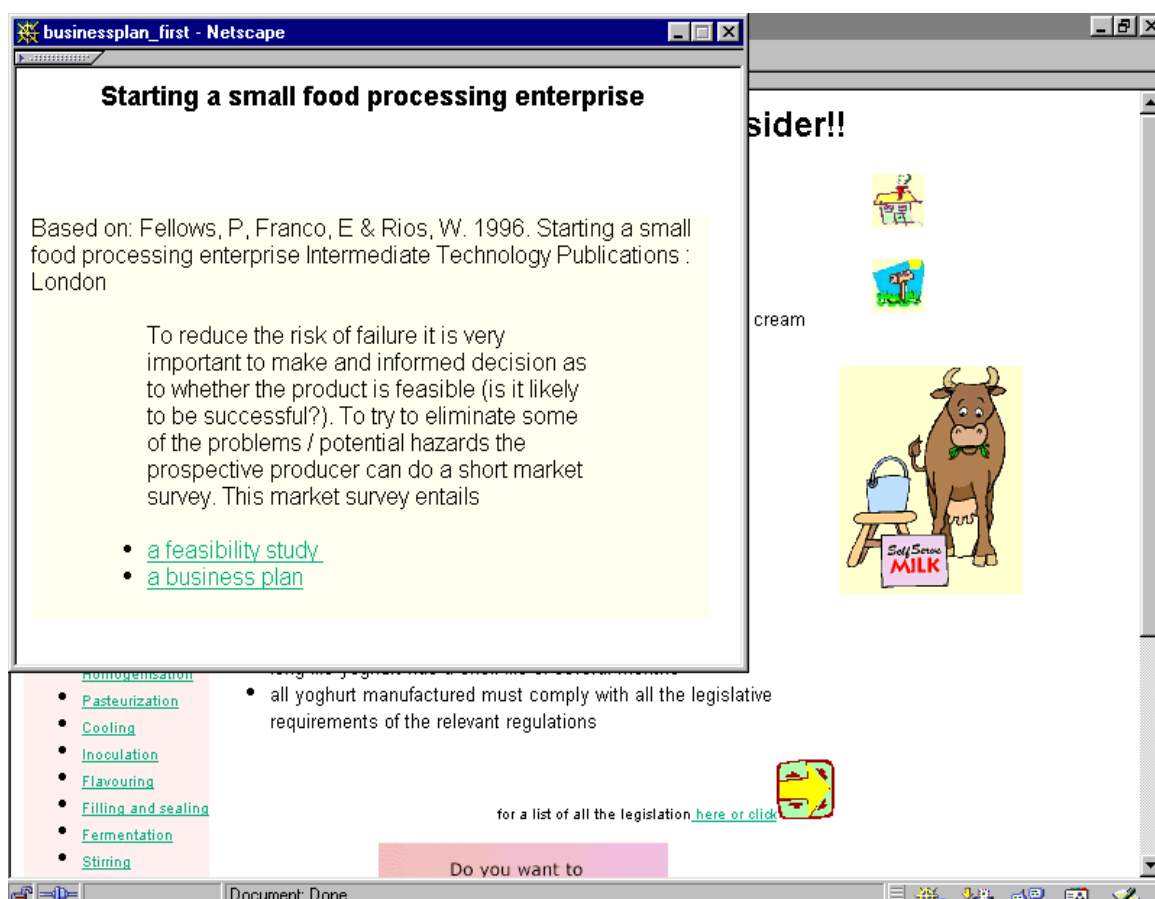
4.5.5　　　Different yoghurt types

A button *"Do you want to know more about the different yoghurt types?"* appears on the first screen (figure 4.8). It gave access to a screen with the two main types of yoghurt (figure 4.10). The selection of either of the two types of yoghurt (plain yoghurt or yoghurt with additions) ,opened a window with a further division into the more specific types of yoghurt (figure 4.11). A button at the bottom of the screen gave access to the determination of the size of the operation (small, medium or large) (figure 4.10).
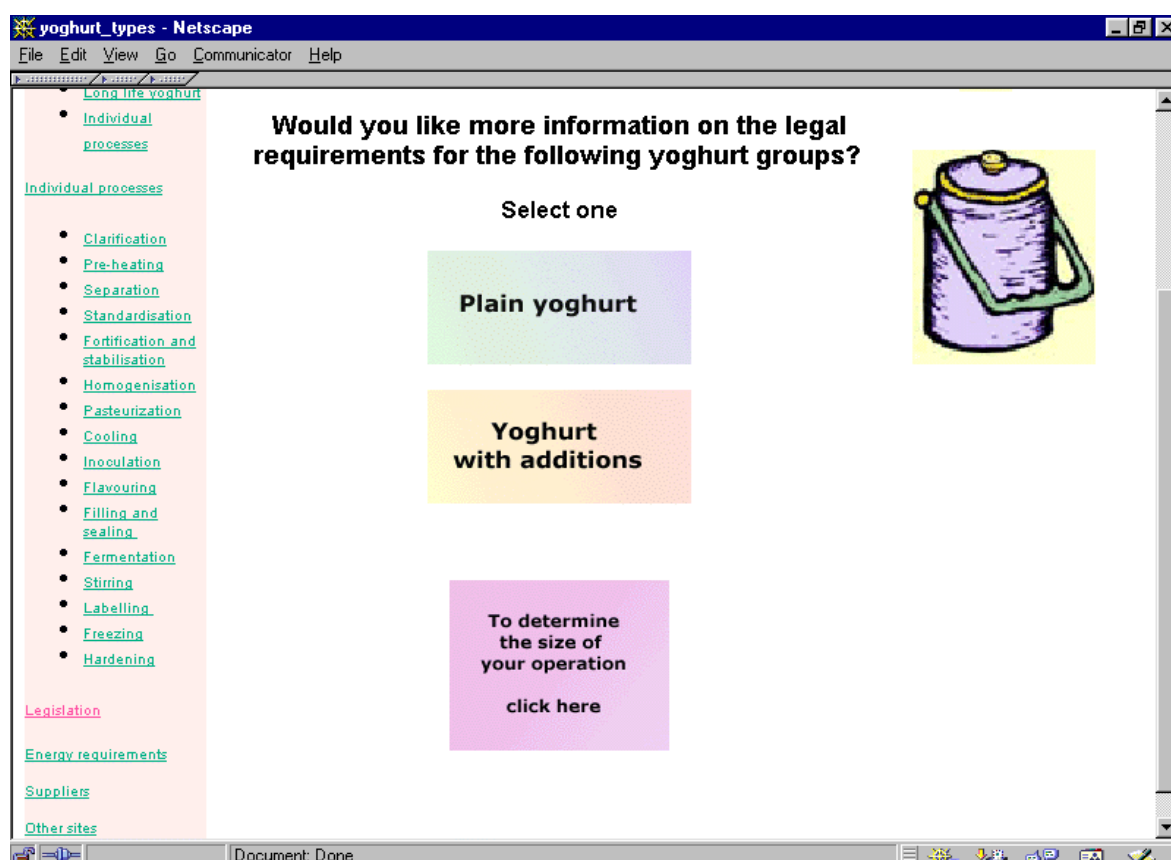
Figure 4.10　　Two main types of yoghurt screen of the third phase

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

150
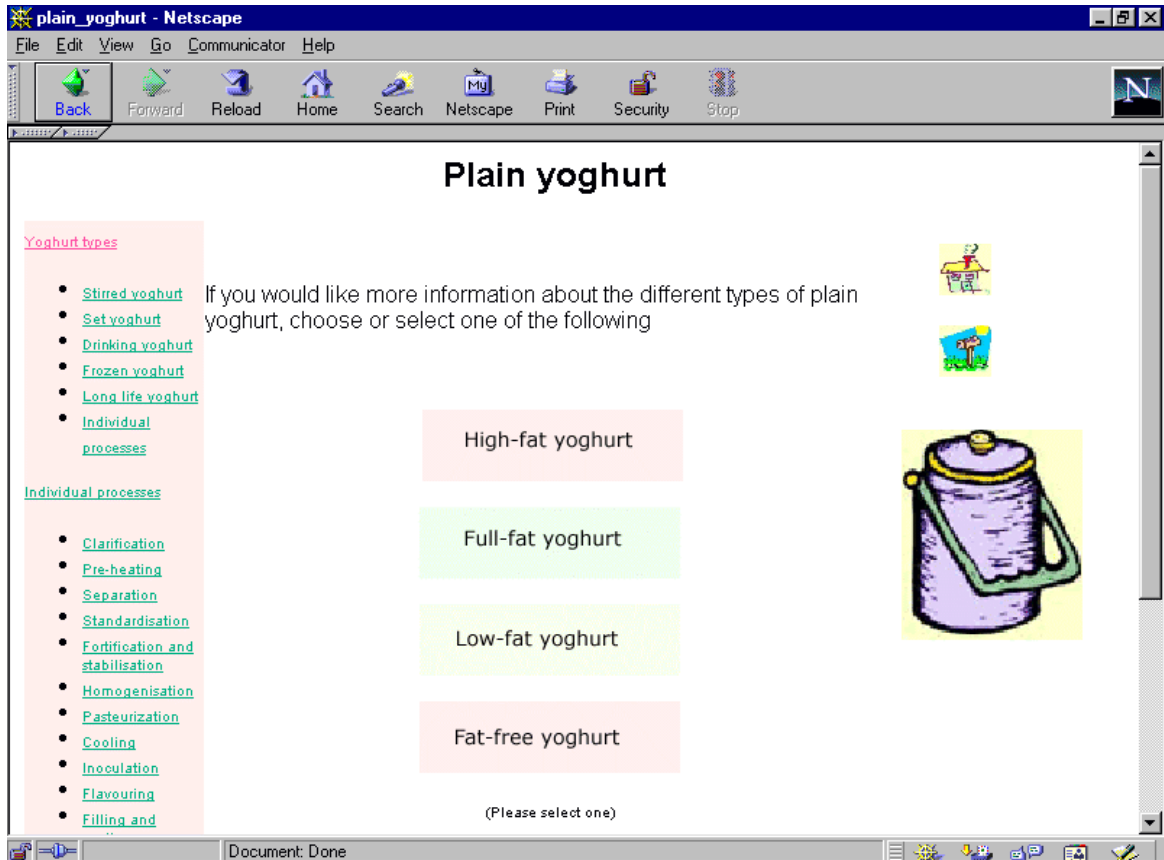
Figure 4.11   Example of plain yoghurt screen of the third phase

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

151

4.5.6 Example of specific yoghurt types

The listed specific types of yoghurt were active links. When selected it opened the legal definition of the selected type of yoghurt in a small screen overlaid on the current screen (figure 4.12).

Figure 4.12 Definition of selected yoghurt overlaid on types of yoghurt screen

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

152
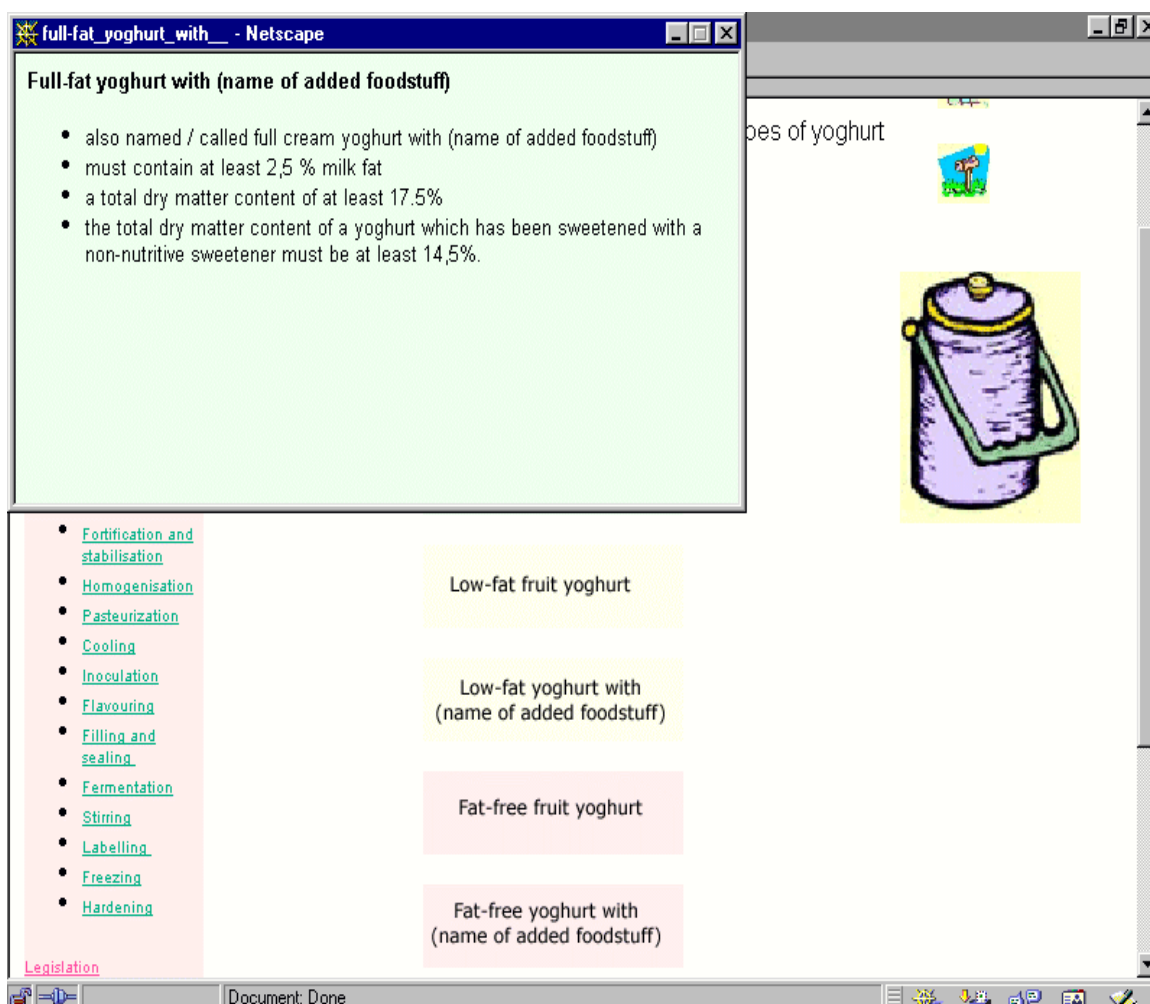
4.5.7 Different scale of processing

Small, medium and large scale processing was included. The user made a choice of processing capacity, which lead either to a small, medium or large scale processing screen (figure 4.13).

Figure 4.13   Medium scale processing screen of third phase

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

153

4.5.8   Various manufacturing methods

The previous screen gave the user access to the various manufacturing methods (figure 4.14). Detailed printable versions of complete manufacturing process were also included (figure 4.14).

Figure 4.14   Various manufacturing methods of yoghurt of the third phase

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

154
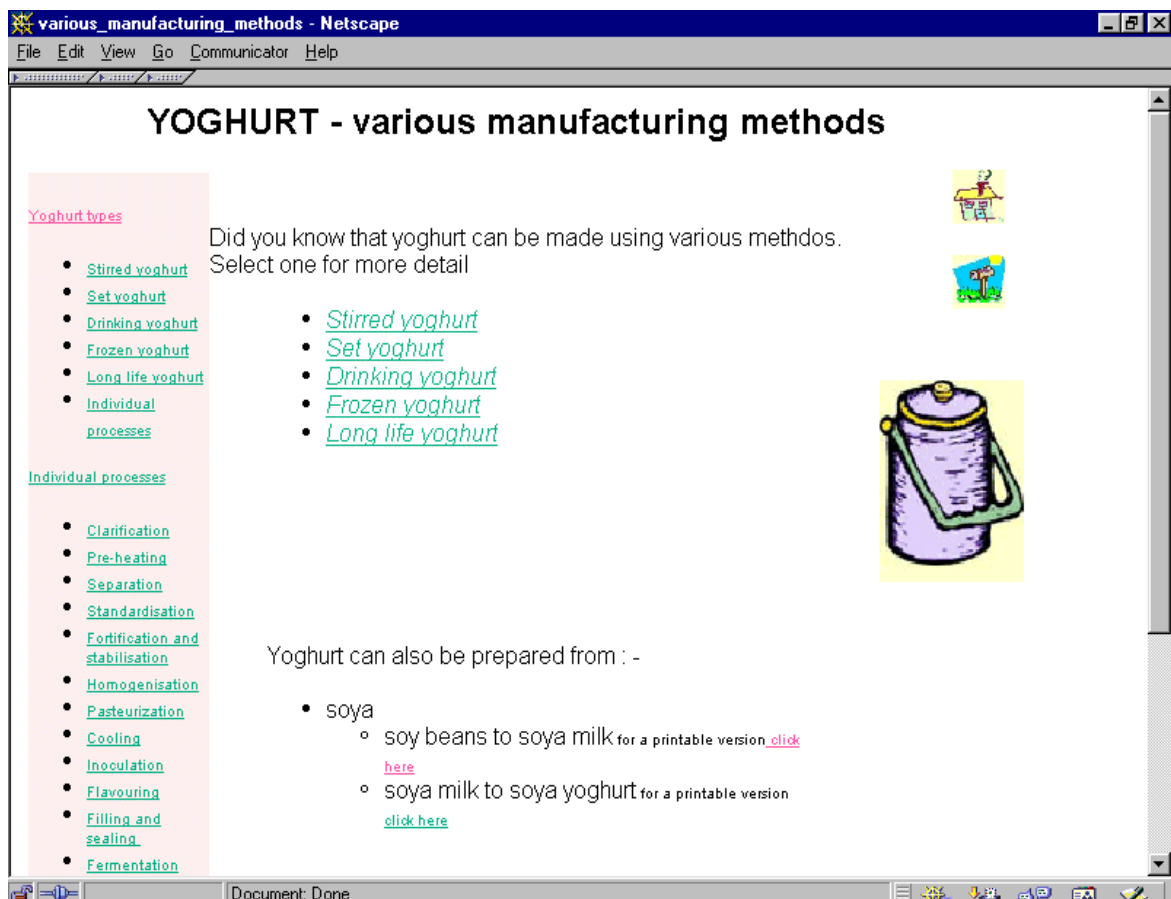
4.5.9   Specific yoghurt types

After selection of a specific type of yoghurt, a new screen was opened. On this screen links to small, medium and large scale processing appeared (figure 4.15).

Figure 4.15   Stirred yoghurt screen with links to various scales of processing
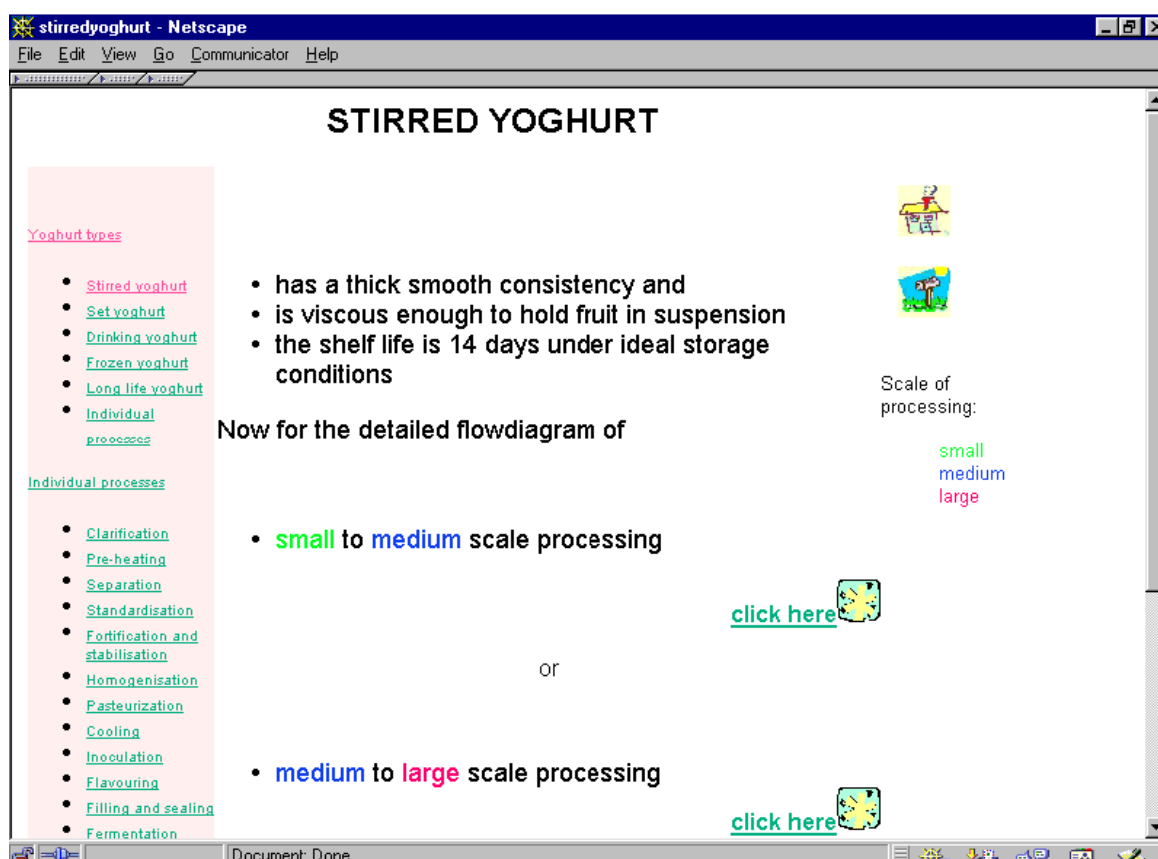
4.5.10   Screen with flow diagram

A flow diagram with links to the individual processes was opened when a specific scale of processing was selected (figure 4.16).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

155

Figure 4.16   Flow diagram for frozen yoghurt

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

156
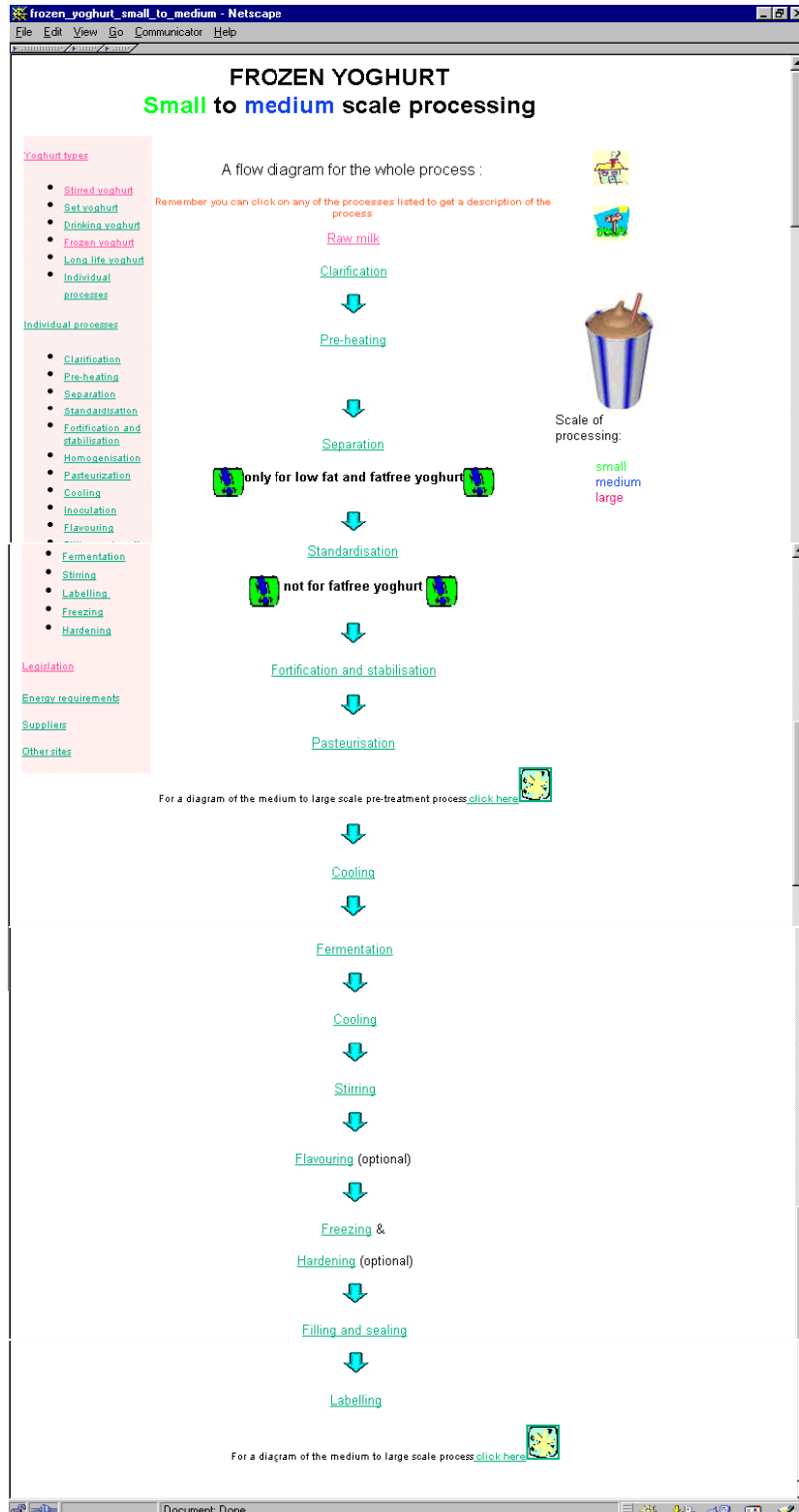
4.5.11   Screens with information on pretreatment and processing

These screens gave access to the processing diagrams for the pre-treatment process (figure 4.17) and the processing diagram for the specific product (figure 4.18).

Figure 4.17   General pretreatment processes for all cultured milk products screen

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

157
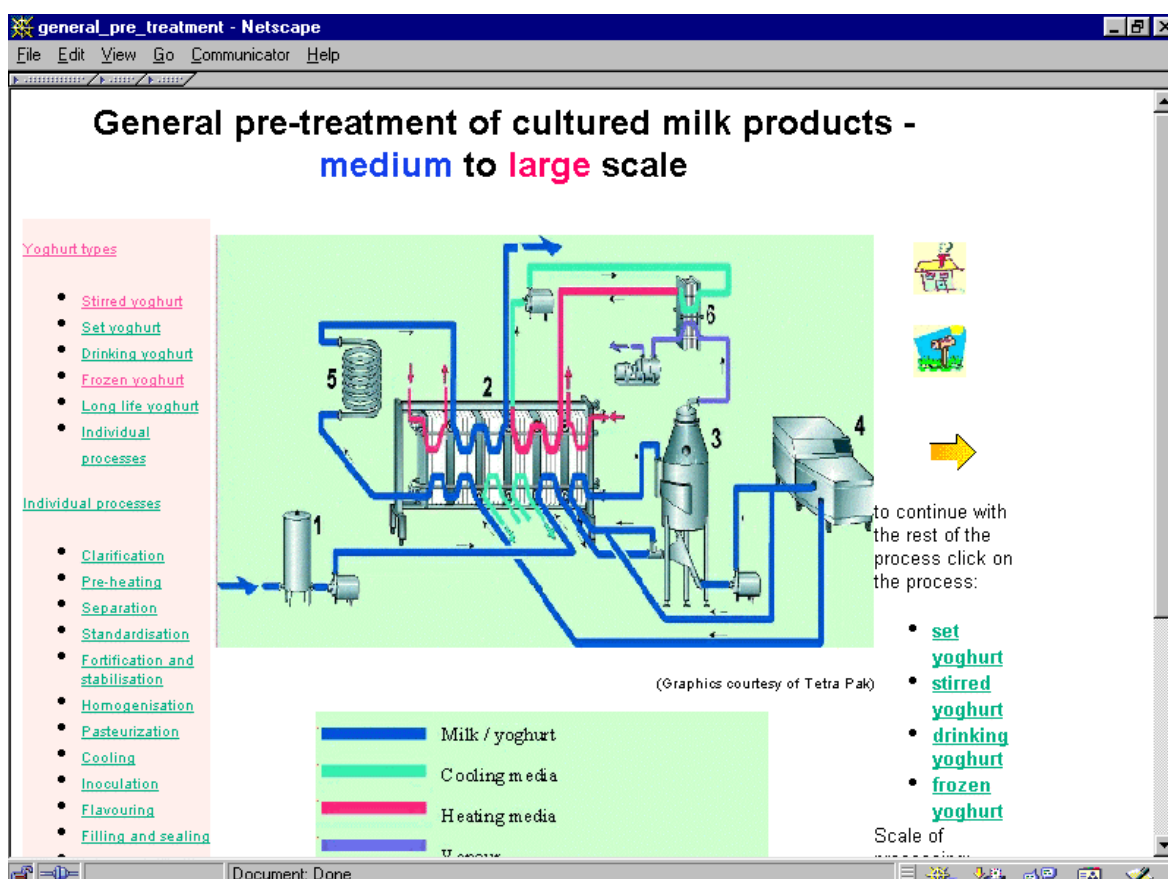
Figure 4.18   Diagram of drinking yoghurt processing
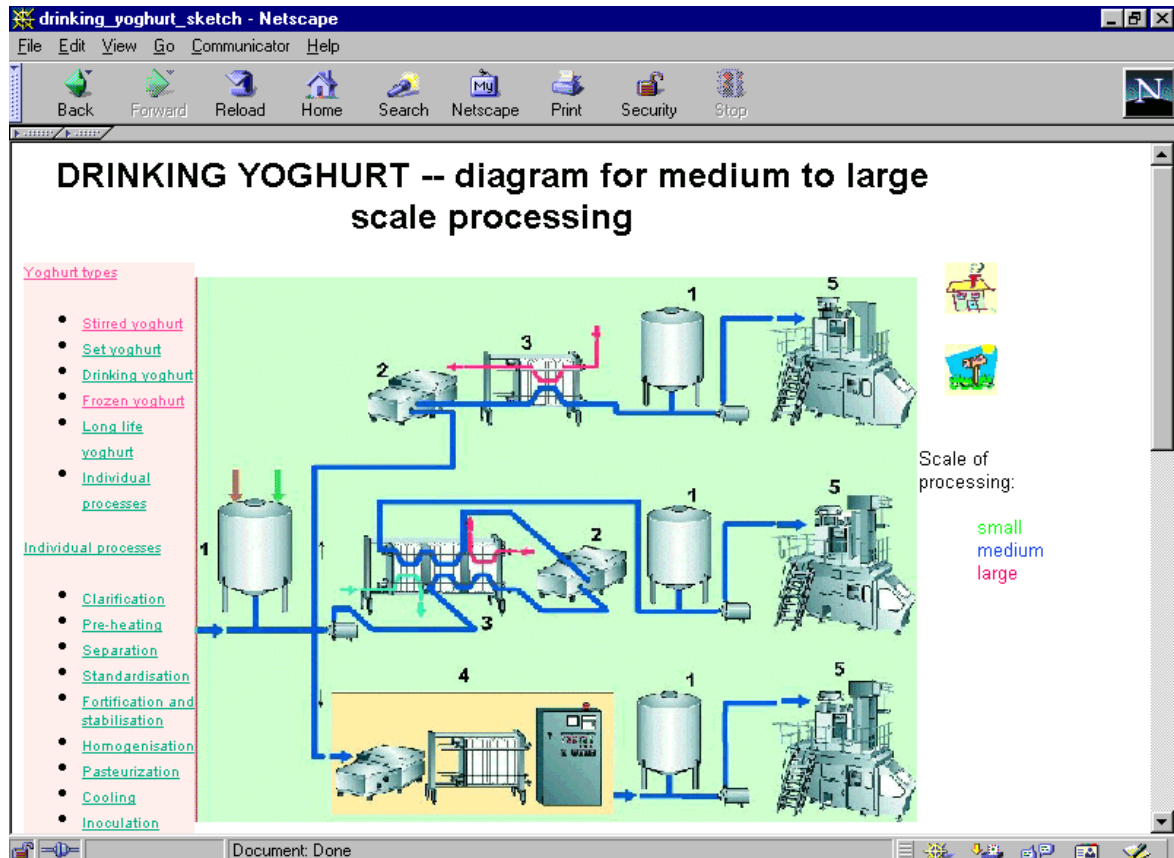
The diagrams contained a number of hot spots on most of the specific equipment in the diagram. By clicking on the specific piece of equipment appearing on the screen, the user should be taken to the process for which the equipment is used, eg by clicking on "fermentation tank" opened a new screen with the fermentation process (Figure 4.19).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

158

The definitions of the individual processes were highlighted by a background in a different colour (figure 4.19). The individual processes also contained links to diagrams of equipment, where available (figure 4.19).

Figure 4.19   Individual processing - separation

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

159
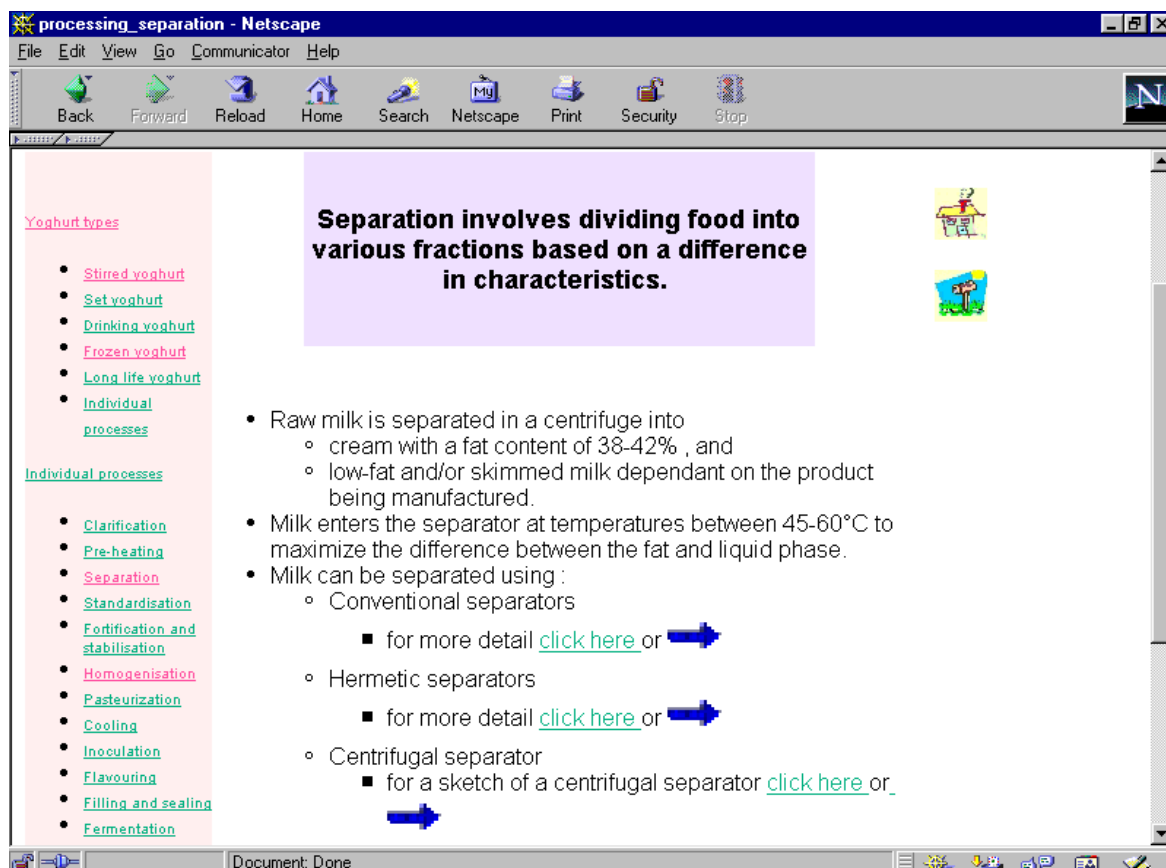
4.5.12   Screens with other information of interest

The number of screens with other information of interest were increased. These screens contained less information in bulleted lists (figure 4.20). The list of legislative requirements was bulleted and included links to other web resources of possible interest to prospective yoghurt producers.

Figure 4.20   Legislation

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

160
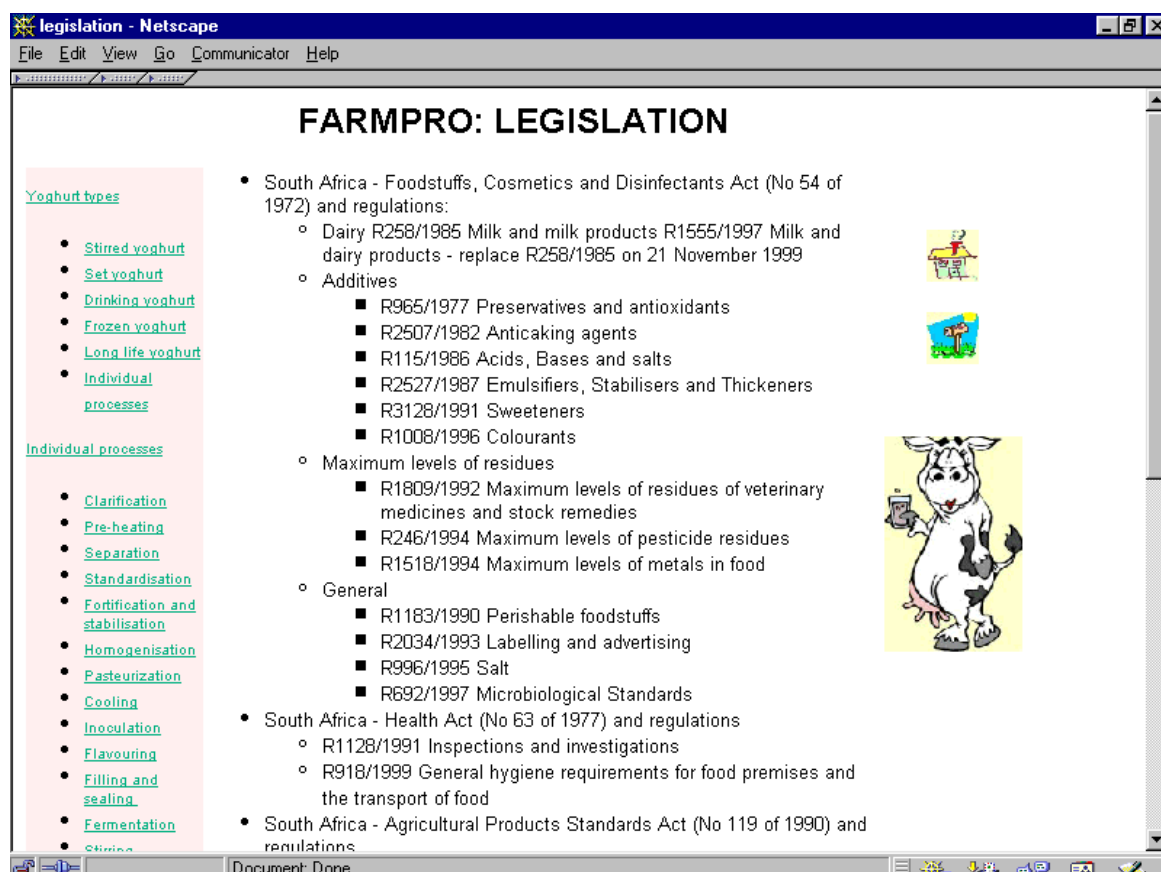
4.5.13 Screens giving information on energy requirements

A summary of energy requirement was included to allow the farmer to determine how much electricity was needed for making a specific kind of yoghurt (figure 4.21).

Figure 4.21   A summary of the energy requirements for making long life yoghurt

energy_requirements_llset-summary - Netscape
File Edit View Go Communicator Help

(All figures included here are approximate for guidance only).

- Stirred yoghurt
- Set yoghurt
- Drinking yoghurt
- Frozen yoghurt
- Long life yoghurt
- Individual processes

Individual processes

- Clarification
- Pre-heating
- Separation
- Standardisation
- Fortification and stabilisation
- Homogenisation
- Pasteurization
- Cooling
- Inoculation
- Flavouring
- Filling and sealing
- Fermentation
- Stirring
- Labelling
- Freezing
- Hardening

Legislation

1. Energy usage (kJ/kg yoghurt produced)

	Electrical	Other	Total
Process	98.56	344.24	442.89
Other	74.70	92.17	166.87
Total	173.35	436.42	609.76

This gives an estimate of actual energy required per kilogram of product processed as shown on the energy diagram. The figures are grouped to show the energy which is most usually provided electrically and that which is most usually provided by other sources. The figures may be converted to kilowatt hour per kg of product (kWh/kg) by dividing by 3600. The annual energy requirements (kWh per year) can be found by multiplying the factors given above by the total annual capacity (kg) and dividing by 3600.

2. Installed electric power (excluding boiler)

Plant capacity (l/day raw milk)	20000
Total installed power (kW)	59.03
Motors (kW)	51.03
Heating (kW)	6.00
Lighting (kW)	2.00

These figures give an estimate of the installed power for the factory at typical flow rates. These figures assume that the

For a diagram of the energy requirements of this summary

click here

Document: Done

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

161

A diagram (figure 4.22) of the energy requirements was also included

Figure 4.22   Diagram of the energy requirements for making long life yoghurt
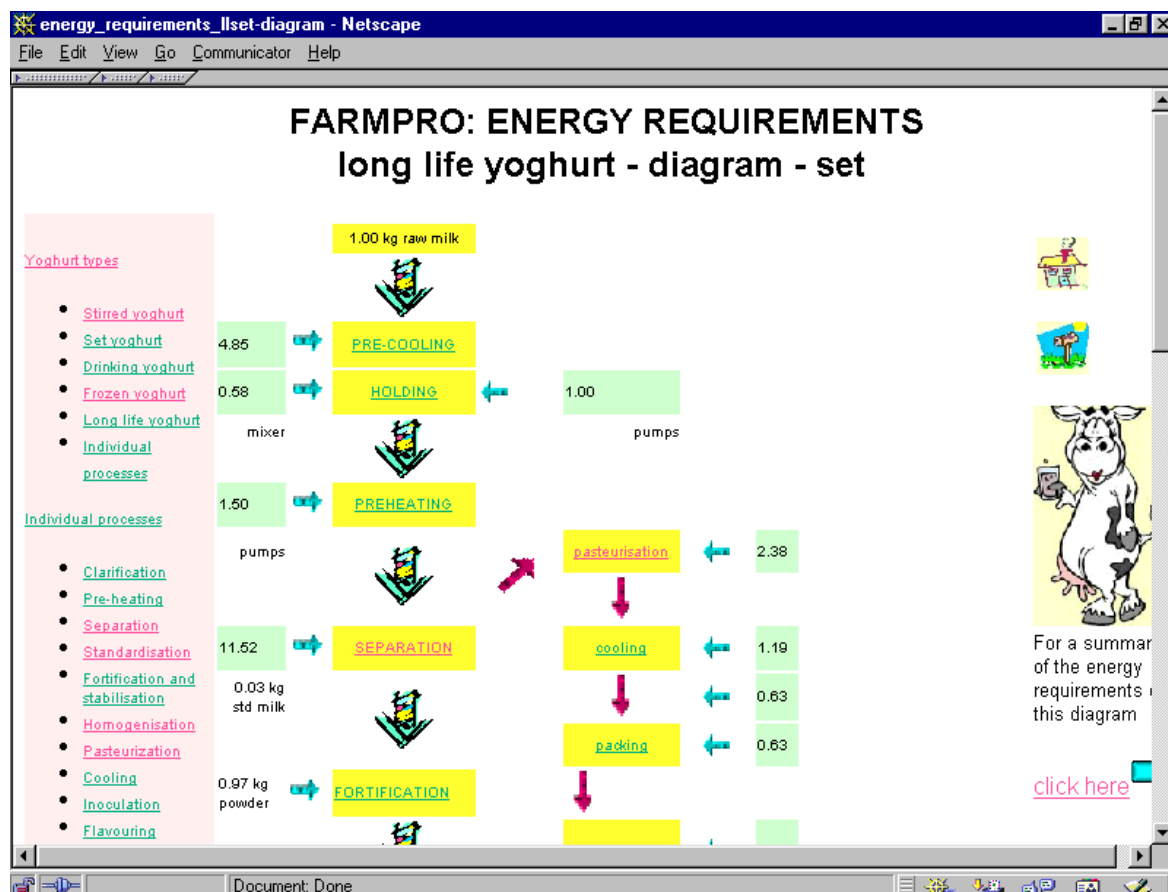
4.5.14   The development of a Quick tour

It became clear that the provision of an additional feature, namely a Quick tour would
be advisable. Prospective users could then skip through this linear part of the web site
quickly. It gave an overview of what is included in the Complete picture. The user
could make only a few choices at the beginning of this part of the web site, selecting
the type of yoghurt.   The scale of processing could then be selected on this screen for

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

162

the type of yoghurt (figure 4.23). To eliminate the waste of screen space, the Quick tour also opened as a small screen as an overlay on the introductory screen (figure 4.23).

The Quick tour contained only definitions of the individual processes. For more information, the user had to return to the Complete picture. All screens of the Quick tour contained an icon for an e-mail message to the author of the web site and Quick tour home, where the user could return to the first screen of the Quick tour. On the first screen of the Quick tour, an icon was present to allow the user to return to the home page of the Complete picture (figure 4.13).

Figure 4.23   Quick tour introductory screen

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

163
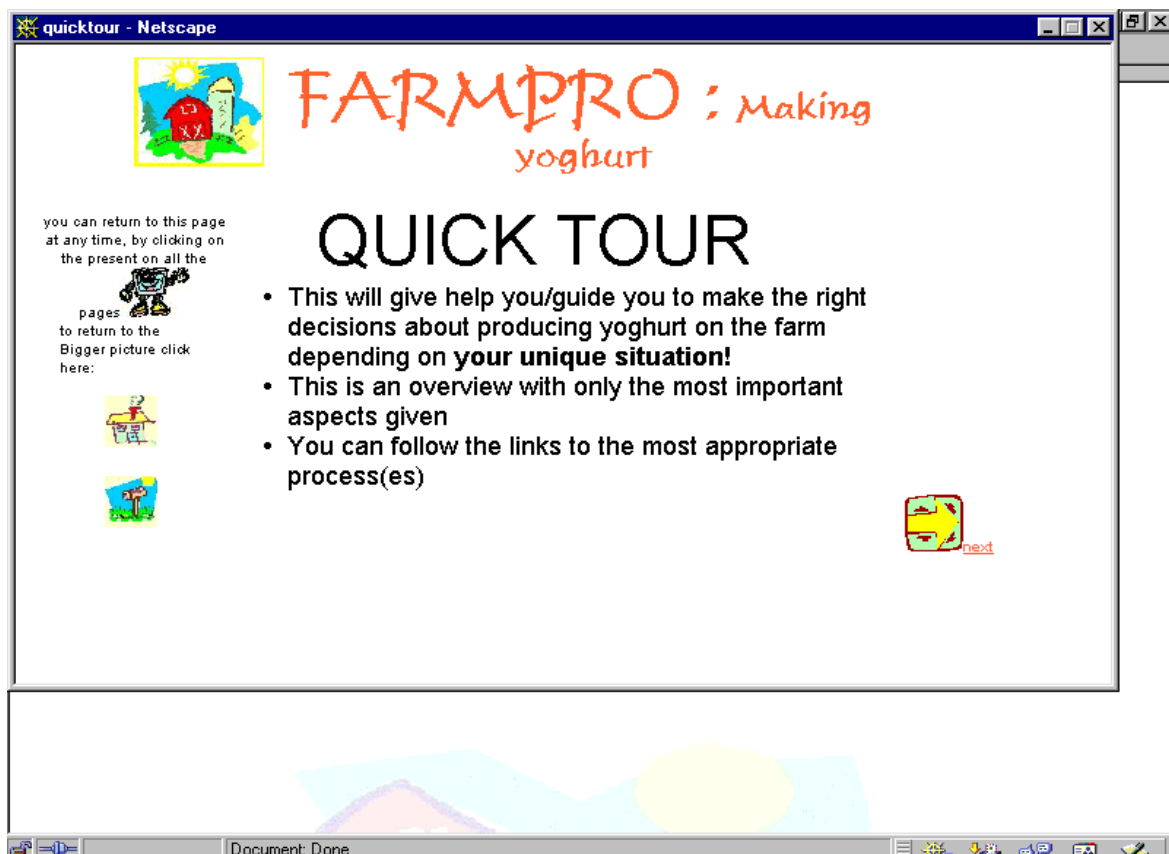
The introductory screen (fig 4.23) gave access to a screen where a brief definition of the specific yoghurt type was given (figure 4.24).

Figure 4.24   Quick tour - stirred yoghurt

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

164
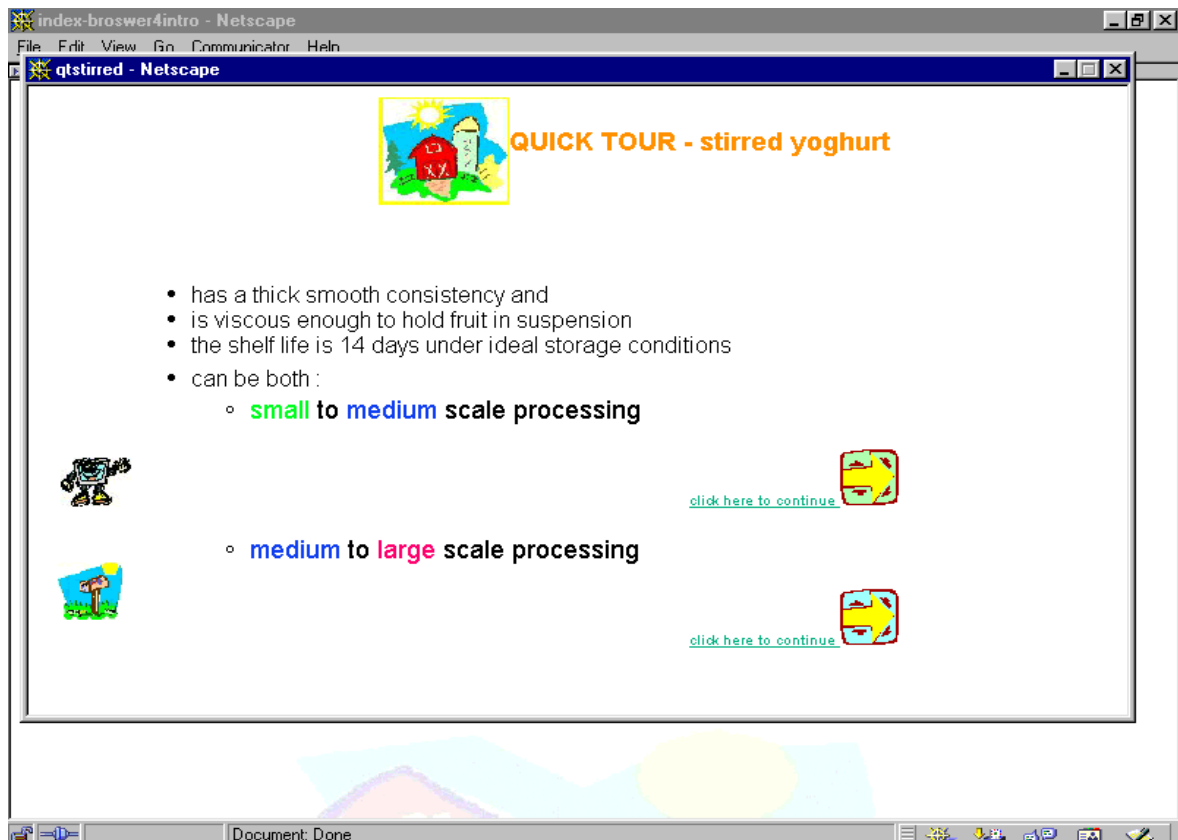
The selection of one of the processes opened a screen with a flow diagram (figure 4.25). The user could continue linearly with either the process by clicking on the next button (arrow) or the individual process could be accessed. From there the user could continue in a linear manner through the rest of the web site.

Figure 4.25   Flow diagram for stirred yoghurt -medium to large scale

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

165
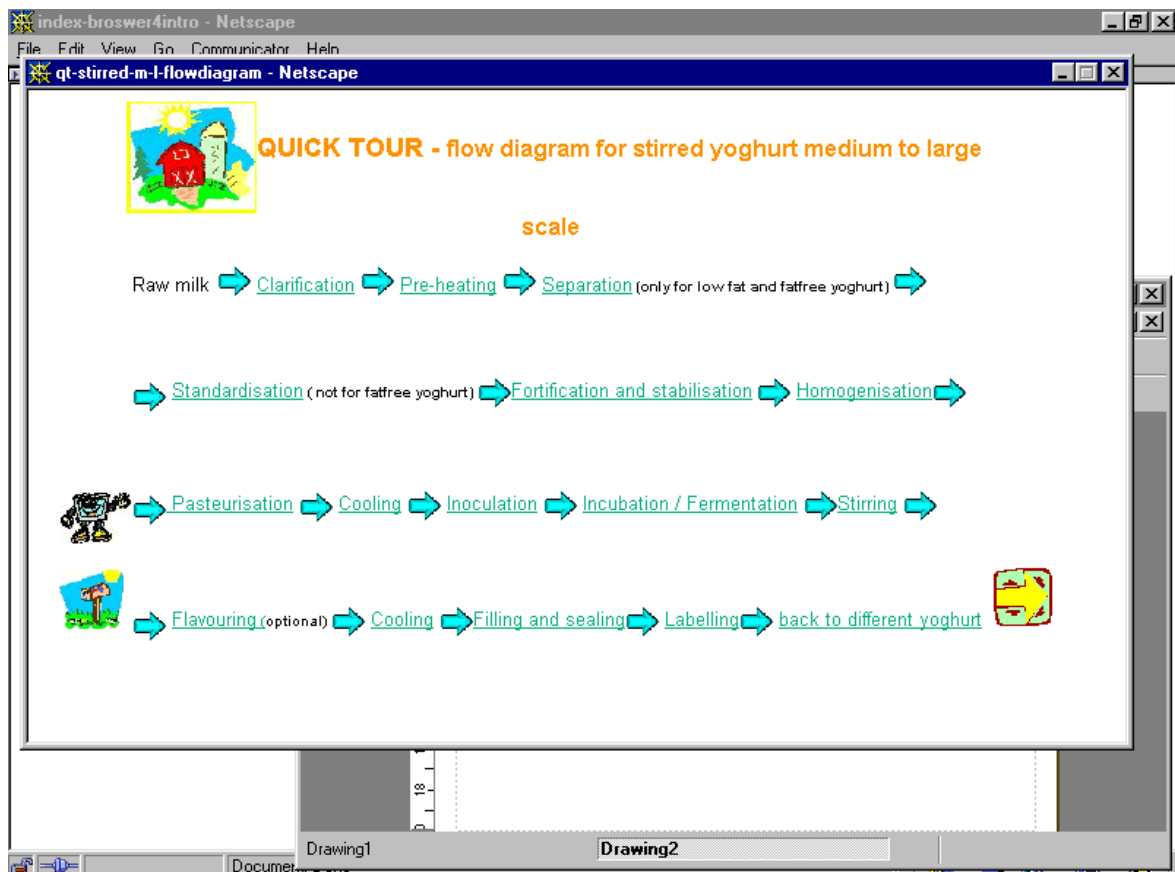
4.6 Summary

The guidelines discussed in the previous chapter provided a conceptual framework for organizing and designing effective user interfaces (Jones & Okey, 1995:9; Sloss, 1995:13-15). After consideration of all the requirements listed, a first prototype web site (first phase) was designed. This web site was peer evaluated and all problems encountered, comments and recommendations were taken into consideration for developing the second phase. This second phase web site was an extension of and improvement of the first phase web site.

The second phase web site was also evaluated. Problems were reported and suggestions made. The third phase web site was then developed and extended to include more information. Printable files of the processes were included as well as recipes for drinking yoghurt and yoghurt made in the microwave oven. A checklist for labelling was also included, which although not complete, included most of the major points regarding labelling legislation.

A brief outline of a business plan was also included, containing very basic information. Links were provided to online sources and institutions where help could be obtained. The business plan consisted of separate sections, namely:

- A feasibility study covering:
  - marketing aspects;
    - evaluation of the potential consumer;
    - evaluation of competitors;
    - estimate of the expected size of the market share;
  - technical aspects; and
  - financial and legal aspects.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

166

- A business plan covering:

    - sales and marketing;

    - technical requirements;

    - legal considerations; and

    - finances.

- Sources of information:

    - business plans on the World Wide Web; and

    - banks.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

167

Chapter 5: Evaluation of the prototype web site

5.1 Introduction

The necessity for the evaluation of web sites becomes increasingly important as more information becomes available on the web (Alessi & Trollip, 1991:384; Harris, 1997:1; Hawkins, 1999:1; Nicholas et al., 1999:144; Petersen, 1999:1; Rettig & LaGuardia, 1999:1-3). Information on the web is available in a wide range of formats, covering many subjects and topics, but varying considerably in quality (Crosby & Stelovsky, 1995:147; Hawkins, 1999:1; Nicholas et al., 1999:144; Rettig & LaGuardia, 1999:1).

After the completion of any web site , it is important for the developer to know to what extent the aims or objectives set at the beginning has been achieved (Alessi & Trollip, 1991:384). Evaluation is also essential to ensure that the information included is accurate and that users can use the site effectively (Alessi & Trollip, 1991:384; Hawkins, 1999:1-2).Evaluation should take place throughout the planning, development and revision stages (Hannafin & Peck, 1988:295; Witt & Wager, 1994:23). During the initial development stages of a web site (the planning phase) a set of potential actions and technologies should be identified and the best method for implementation selected (Trochim, 1999:1). Only after evaluation can it be decided if the best options were chosen.

The generic aim of evaluation is to provide "useful feedback" to a variety of audiences, including clients, administrators, staff, and other relevant parties. Feedback can be important in the evaluation process. The main aim of evaluation should be to influence decision-making or policy formulation, through the provision of empirically-driven feedback (Petersen, 1999:1; Rettig & LaGuardia, 1999:1; Trochim, 1999:1). The correct questions should be asked as well as careful observations made (Alessi &

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

168

Trollip, 1991:384; Collis & Verwijs, 1995a: 12-14; Hawkins, 1999:1; Petersen,
1999:1-2; Vaughan, 1994:24; Witt & Wager, 1994:23).

The first phases of the evaluation of FARMPRO were discussed in depth in a previous
chapter. This chapter deals with the final evaluation of the prototype web site, the
evaluation process and the results of the evaluation. Changes and improvements were
made continuously as problems became apparent and completed after phase three.
The final version of FARMPRO was then also put on a CD-ROM.

5.2   What is evaluation?

A very simplistic definition describes evaluation as the systematic assessment of the
worth or merit of some object (Rettig & LaGuardia, 1988:51-52; Trochim, 1999:1). A
definition that emphasizing the information-processing and feedback functions,
describes evaluation as the systematic acquisition and assessment of information to
provide useful feedback about some object (Trochim, 1999:1). This definition
emphasizes the acquisition and assessment of information, rather than the assessment
of worth or merit. All evaluation involves collecting and sifting through data, making
judgements about the validity of the information and of inferences derived from it,
whether or not it is an assessment of worth or merit (Trochim, 1999:1).

The following steps should be followed in the evaluation process:
- problem formulation;
- conceptualization of the major alternatives;
- detailing of these alternatives and their potential implications;
- evaluation of the alternatives;
- selection of the best alternative; and
- implementation of the selected alternative (Trochim, 1999:1).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

169

After evaluation has been completed, an evaluation report should be compiled,
including the following:

- the major objectives, aims and hypotheses the web site or technology
  wants to achieve. This is usually part of the planning phase;

- the conceptualization and operationalization of the major components of
  the evaluation: the web site, the participants, and the setting;

- the design of the evaluation;

- a detailed plan of how components should be evaluated;

- an analysis of the information received from evaluators (both qualitative
  and quantitative); and

- suggestions on the utilization of the evaluation results (Collis & Verwijs,
  1995a: 12-14; Hannafin & Peck, 1988:295; Trochim, 1999:1).

5.3 Evaluation strategies

Evaluation strategies are the broad, overreaching perspectives on evaluation. The four
major groups of evaluation strategies are scientific-experimental, management-
oriented systems, qualitative/anthropological and participant-oriented models.

- ***Scientific-experimental models:***

Models of this kind are mostly historically dominant evaluation strategies. It
concentrates on the desirability of impartiality, accuracy, objectivity and the
validity of the information generated. Included are experimental and
quasi-experimental designs; objectives-based research; econometrically-oriented
perspectives, which includes cost-effectiveness and cost-benefit analysis; and
theory-driven evaluation (Trochim, 1999:1).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

170

- ***Management-oriented systems models:***

This type of model emphasize comprehensiveness in evaluation, placing evaluation within a larger framework of organizational activities. (Hawkins, 1999:1; Trochim, 1999:1). Examples are:

  - Programme Evaluation and Review Technique (PERT);

  - Critical Path Method (CPM);

  - Logical Framework or "Logframe" model developed at the US Agency for International Development;

  - Units for Treatments and Observing Observations for Settings model (UTOS);

  - Context Input Process Product model (CIPP); and

  - Credibility, Accuracy, Reasonableness, Support checklist (CARS) (Hawkins, 1999:1; Trochim, 1999:1).

- ***Qualitative/anthropological models.***

These models emphasize the importance of observation when there is a need to retain the phenomenological quality of the evaluation context. The value of subjective human interpretation in the evaluation process is recognized. It is naturalistic or "Fourth Generation" evaluation and belongs to qualitative schools with critical theory and art criticism approaches (Trochim, 1999:1).

- ***Participant-oriented models.***

These models emphasize the central importance of the evaluation participants, especially clients and users of the web site or technology. Examples are client-centred and stakeholder approaches (Trochim, 1999:1).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

171

The choice of a suitable evaluation methodology is complex. Evaluation often consists of aspects of all the above strategies to ensure that all aspects are evaluated. For the purpose of this study the models of scientific-experimental and management-orientated systems could not be used, but a combination of qualitative/anthropological and participant-oriented models was regarded as suitable. The reasons are that the qualitative model focusses on observation and naturalistic evaluation, while the participant-oriented model recognises the need for input from clients and users.

5.4   Types of evaluation

There are different types of evaluation, depending on the object being evaluated and the purpose of the evaluation. Both formal and informal evaluation can be used. Informal evaluation can include observation, simple questionnaires and interviews. It allows for the collection of anecdotal data. Formal evaluation requires extensive training in design and statistical data methodologies and implies the collection of empirical data. The choice of a suitable method depends on each situation, and has to take the need and time available for formal evaluation into account (Hannafin & Peck, 1988:299-300). For the purposes of this study only informal evaluation methods were used.

A further distinction can be also be made between formative and summative evaluation (Hannafin and Peck, 1988:300-301; Trochim, 1999:1). Formative evaluation was used throughout the design and development of this web site. Summative evaluation was used during the final evaluation of the web site (Hannafin & Peck, 1988:301).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

172

5.4.1   Formative evaluation

Formative evaluation strengthens or improves the object being evaluated by examining:

- the delivery of the web site or technology; and
- the quality of its implementation (Hannafin & Peck, 1988:301; Trochim, 1999:1).

Formative evaluation is also a continuous evaluation process. It includes several types of evaluation:

- *Needs assessment:*

  To determine who needs the web site, how great the need is, and what might work to meet the need.

- *Evaluability assessment:*

  To determine whether an evaluation is feasible and how stakeholders can help shape its usefulness.

- *Structured conceptualization:*

  To help stakeholders define the web site or technology, the target population, and the possible outcomes.

- *Implementation evaluation:*

  To monitor the fidelity of the web site or technology delivery.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

173

- ***Process evaluation investigations:***

  To establish the process of delivering the web site or technology, including alternative delivery procedures (Trochim, 1999:1).

Formative evaluation can be used in three ways during the development process, namely:

- ***One-to-one evaluation:***

  - done during the initial design;
  - consisting of informal evaluation; and
  - aimed at identifying problems (Hannafin & Peck, 1988:301-302).

- ***Small-group evaluation:***

  - done during the final phase of the design process**;**
  - determining acceptability and effectiveness;
  - taking the form of interviews, observation and records of an anecdotal nature;
  - consisting of a quality review (language, grammar, and content); and
  - using information collected during evaluation (Alessi & Trollip, 1991:365; Hannafin & Peck, 1988:302)**.**

- ***Field test evaluation***:

  - testing of the product in the actual setting (pilot testing);
  - evaluating the final draft;
  - relying mainly on informal and some formal evaluation techniques;

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

174

- consisting of collecting data; and

- followed by revision (Alessi & Trollip, 1991:378-380; Hannafin & Peck, 1988:302).

During field-testing evaluation, it is necessary to consider the ultimate user of the web site (ranging from novices to experts) to ensure that the requirements are met (Alessi & Trollip, 1991:384). It is also important to clarify the fact that the web site and not the performance of the users are evaluated (Alessi & Trollip, 1991:384; Witt & Wager, 1994:23).

5.4.2 Summative evaluation

Summative evaluation examines effects or outcomes of an object by:
- describing what happens subsequent to delivery;
- assessing whether the object can be said to have caused the outcome envisaged; and
- estimating the relative costs associated with the object. (Hannafin & Peck, 1988:301; Trochim, 1999:1).

Summative evaluation can be subdivided into the following areas:

- *Outcome evaluation*
  Investigating whether the web site or technology caused demonstrable effects on specifically defined target outcomes.

- *Impact evaluation*
  Assessing the overall or net effects (intended or unintended) of the object or technology as a whole.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

175

- ***Cost-effectiveness and cost-benefit analysis***

  Addressing questions of efficiency by standardizing outcomes in terms of their costs and values.

- ***Secondary analysis***

  Reexamining existing data to address new questions or use methods not previously employed.

- ***Meta-analysis:***

  Integrating the outcome estimates from multiple studies to arrive at an overall or summary judgement on an evaluation question (Trochim, 1999:1).

5.5 Evaluation questions and methodologies

The questions used in the evaluation process can be selected within the framework of both formative and summative evaluation (Hannafin & Peck, 1988:301; Trochim, 1999:1). Tools to evaluate the usability of multimedia web sites are not yet available (Petersen, 1999:1). It is accepted practice to use a combination of evaluation methodologies to evaluate multimedia. The major questions and methods of evaluation are the following (table 5.1):

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

176

Table 5.1 Questions and methodologies (Hannafin & Peck, 1988:301-310;

Hawkins, 1999:1; Trochim, 1999:1)

Question	Method
Formative evaluation	
What is the definition and scope of the problem or issue, or what is the question?	Formulating and conceptualizing methods might be used including brainstorming, focus groups, nominal group techniques, stakeholder analysis, lateral thinking, input-output analysis, and concept mapping.
Where is the problem and how big or serious is it?	Needs assessment which can include: analysis of existing data sources, the use of sample surveys, interviews of constituent populations, qualitative research, expert testimony, and focus groups.
How should the web site or technology be delivered to address the problem?	Some of the methods already listed can also be used, and also simulation techniques, or multivariate methods like multi-attribute utility theory, decision-making methods; and project planning and implementation methods like flow charting, PERT/CPM, and project scheduling.
How well is the web site or technology delivered?	Qualitative and quantitative monitoring techniques, use of management information systems, and implementation assessment.
Summative evaluation	
What type of evaluation is feasible?	Evaluability assessment used, as well as standard approaches for selecting an appropriate evaluation design.
What was the effectiveness of the web site or technology?	Observational and correlational methods for demonstrating whether desired effects occurred, and quasi-experimental and experimental designs for determining whether observed effects can reasonably be attributed to the intervention and not to other sources.
What is the net impact of the web site?	Econometric methods for assessing cost effectiveness and cost/benefits would apply here, along with qualitative methods that enable summarization of the full range of intended and unintended impacts.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

177

5.6 Design of a questionnaire

Numerous evaluation sources are available that can be used as a guideline to compile a questionnaire. (Children's, 1995:1-4; CKSD, 1999:1-5; Collis & Verwijs, 1995a: 12-14; Evaluating instructional, 1998:1; Evaluation methodologies, 1999:1-3; Five, 1998:13; Hawkins, 1999:1-8; Instructional, 1998:1-6; Kerr, 1998:1-3; Petersen, 1999:1-2; Professional, 1998:1-2; Reeves, 1993: 1-15; Smith, 1999:1-4; Software evaluation procedure, 1998:1-2; Software evaluation criteria, 1998:1; Vaughan, 1994:24; Witt & Wager, 1994:23).

Questionnaires are usually paper-based and are completed by the user or respondent (Kunz et al., 1992:9; Prasad, 1987:1-15; Trochim, 1999:1-2). During the design of the questionnaire it is important to ensure that all possible alternatives are covered, that it is of reasonable length, that the wording is impartial and that is easy to complete (Trochim, 1999:1-3). The questionnaire can use open-ended questions where users are allowed to give unstructured responses.

It is important to ensure that questions included in a questionnaire address the issues at hand and do not deal with generalities (Kunz et al., 1992:9; Prasad, 1987:1-15; Trochim, 1999:1-2). The questions included should:
- be necessary and useful;
- focus on one aspect at a time only;
- be understood by the user;
- be within the experience of the user;
- be specific when required;
- be general when needed;
- not be biased or loaded to force the user to make a certain decision;
- allow the user to respond truthfully; and
- not be misunderstood by the user (Trochim, 1999:1-4).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

178

5.7 Evaluation of the prototype web site

During the development of the prototype web site, both formative and summative evaluation was done. The first three phases was evaluated using formative evaluation. After the changes suggested during these phases were made, the final prototype was evaluated by using summative evaluation.

The initial evaluations were part of the development phase. During this phase the web site was evaluated twice, using group evaluation done by classmates, as well as one-to-one evaluation by a staff member of Agrelek. After the development phase, including two rounds of formative evaluation, the web site was evaluated by summative evaluation.

Because the evaluation of the web site is a very important part of the design process, it should be evaluated by as wide a spectrum of users as possible, especially those forming part of the target group. Dairy farmers should be the most important evaluators. To reach them a listserver (PC Internet of *Landbouweekblad)* was used. An initial message was posted asking interested persons to indicate their interest by e-mailing their addresses to the developer of the web site. Upon receipt of the addresses, the questionnaire with the URL of the web site was e-mailed to them. They were asked to return the questionnaire by a certain date. Most of the respondents replied before this date. The evaluators who did not return their questionnaires were again e-mailed with the URL and a request to return their responses as soon as possible. Most respondents eventually returned their questionnaires. Four farmers did not return their questionnaires, but a total of ten farmers with dairy interests replied.

Subject matter specialists were also asked to evaluate the web site. These specialists consisted of two distinct groups: food scientists with a dairy background and agricultural engineers. Five food scientists and five engineers evaluated the web site.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

179

To ensure that the web site can also be used by the novice web user it was evaluated by novices with no dairy farming or engineering background. A total of five novices evaluated the web site.

All the evaluators were given exactly the same questionnaire and the same time limits were set. A total of twenty-five users evaluated the web site.

The questionnaire for the evaluation of this web site was compiled using the guidelines mentioned in 5.6. After further refinement the questionnaire in figure 5.1 was compiled. Only eighteen (18) questions were included. Questions were limited because users had to view and evaluate the web site on-line. To ensure that not too much time is spent on answering questions, the questionnaire was kept simple and straightforward. It also ensures that evaluators do not loose interest and fail to complete the questionnaire.

A general classification of aspects, similar to the one used in the design (previous chapter) was used. This classification includes the following categories:

- ***Questions about content*** (text, screen);
- ***Questions about navigation*** (navigation)**;**
- ***Questions about ease of use*** (navigation; screen); and
- ***Questions about overall impression*** (text, screen)**.**

An additional section for general comments was added to allow users to add comments not provided for in the questions themselves. An example of the final questionnaire is included in figure 5.1.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

180

Figure 5.1 Questionnaire sent to evaluators

Questionnaire

Thank you for your willingness to participate! Please answer the following questions as fully as possible. Feel free to add any general comments at the end. Remember your input is important to us and should most definitely be taken into consideration when making changes to the web site. Return your comments to helenebl@global.co.za by 13 October 1999.

Content:

Is the content factual, correct and current?

Is the web site content appropriate for the intended users?

Are the terms defined adequately?

Is sufficient information supplied?

Is the presentation of content consistent?

Navigation:

Does the web site allow you to move backwards, forwards and sideways?

Is the navigation bar easy to use?

Is the contents of the navigation bar sufficient?

Ease of use:

Is the information presented in manageable segments?

Are the instructions clear?

Is there interaction between user, computer and web site?

Did you experience any technical difficulties?

Is the web site easy to use?

Is the display clear and easy to read?

Overall impression

Graphics?

Colours?

Font?

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

181

5.8 Results of evaluation

Responses were listed, grouped and integrated. Comments of an editorial nature (eg. spelling and language errors) were not listed and were corrected.

5.8.1   Questions related to content

5.8.1.1   Is the content factual, correct and current?

- The majority agreed that the content was factual, correct and current.

Comments:

- No sketches for small scale processing were included.

5.8.1.2   Is the web site content appropriate for the intended users?

- The majority indicated that the content was appropriate for farmers who are interested in making yoghurt.

Comments:

- Energy diagrams might confuse users.

5.8.1.3   Are the terms defined adequately?

- The majority agreed that the terms were adequately defined.

Comments:

- Some of the terms should be explained for novices.
- Terms used in the Quick tour were not always easy to understand.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

182

5.8.1.4   Is sufficient information supplied?

- The majority agreed that sufficient understandable information by farmers was supplied.

Comments*:*

- Although a reference to scale (small, medium en large) appeared on the right side of the screen these were not active links.
- Including some recipes for yoghurt may be useful.

5.8.1.5   Is the presentation of content consistent?

- The majority agreed that the presentation was consistent.

Comments:

- The first few screens and Quick tour screens were not the same as the rest of the screens.

5.8.2   Questions related to navigation

5.8.2.1   Does the web site allow you to move backwards, forwards and sideways

- The majority indicated that it was easy to move backwards, forwards and sideways.

Comments*:*

- To move backwards the back button had to be used.
- Problems were experienced with the first screens of the web site. It only showed a white screen with a few buttons at the left and right side of the screen (was the result of browser incompatibilities).
- No movement backwards or sideways was possible on the Quick tour .

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

183

5.8.2.2   *Is the navigation bar easy to use?*

- The majority of the evaluators found the navigation bar easy to use.

Comments:

- There was no navigation bar in the Quick tour.

5.8.2.3   *Is the contents of the navigation bar sufficient ?*

- The majority indicated that the contents of the navigation bar was sufficient.

Comments*:*

- A user might not want to work through the whole Quick tour, which was in a linear format.

5.8.3   Questions related to ease of use

5.8.3.1   *Is the information presented in manageable segments?*

- The majority felt that the information was presented in manageable, easy to read and understandable segments.

Comments:

- The segments of information was too small and took a long time to print.

5.8.3.2   *Are the instructions clear?*

- The majority agreed that the instructions were clear and concise.

Comments:

- Some respondents had to return to the first screens to read through the instructions which they had disregarded at the beginning.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

184

- More pop-up messages (ALT codes) and pull-down menus would be helpful.

5.8.3.3   *Is there interaction between user, computer and web site?*

- All respondents indicated that interaction was possible. When certain choices were made, the web site returned required information.

Comments

- No specific comments for change or improvement was made.

5.8.3.4   *Did you experience any technical difficulties?*

- The majority experienced no technical difficulties.

Comments:

- Some users reported a "time-out" message while downloading some screens.

5.8.3.5   *Is the web site easy to use?*

- The majority found the web site easy to use.

Comments:

- Some evaluators found the web site not so easy to use, but after reading the instructions on "how to use this site" at the very beginning of the site this problem was eliminated.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

185

5.8.3.6   Is the display clear and easy to read?

- The majority users found the display clear and easy to read.

Comments*:*

- Some complained that the font of the text was too small.

- Empty spaces were confusing.

- The white background made it easy to read the text.

- Pop-up messages (ALT codes) did not appear on the active spots on all the sketches. The only pop-up message visible was the name of the complete sketch.

- Some could not see the pop-up messages (ALT codes) for arrows and other signs at all.

5.8.4   Questions relating to overall impression

5.8.4.1   Graphics?

- The majority had no negative comments on the graphics.

Comments:

- Problems were experienced where graphics were not visible, and a time-out message was given.

- The graphics used for "home to Quick tour" was not regarded as suitable.

5.8.4.2   Colours?

- The majority had no problem with the colours.

Comments*:*

- The light green colour used to indicate small scale processing was not always very easy to read.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

186

- The contrast between active links and visited links made it clear to the user which information had already been accessed.

5.8.4.3 *Font?*

- The majority found the font acceptable.

Comments:

- Some found it too small to read with ease.

- More than one font was visible in the same paragraph.

5.8.4.4 *General comments (verbatim):*

- "Much information was provided, which must have taken hours to compile."

- "It was an impressive and valuable web site, rich in balanced and valuable information."

- "Fantastic, tempts the tastebuds to read more."

- "We, the farmers, need this type of innovation."

- "Good, excellent work."

- "Web site reads easily and was easy to use. It was relatively easy to master the contents and it covers an extensive range of subjects."

- "Very impressive, well done."

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

187

5.8.5   Some general comments dealing with the site

5.8.5.1   Screen

Comments:

- The whole flow diagram should be visible on one screen without needing to scroll.

5.8.5.2   Navigation

Comments:

- Too many screens preceded the screen where a choice between the Quick tour and the Complete picture can be made. Evaluators of Eskom said that they preferred that a maximum of 5 clicks should bring the user to the source of information, otherwise he would loose interest.
- The home page should default to a screen other than the one in use on the web site at the time of the evaluation. It took too long to work through the first 4 screens if a user had to return to the home page every time.
- The date of the web site and name of the author should be included.
- The small to medium flow diagrams had links to medium to large scale sketches.
- It took too long to get to essential information.
- Energy requirements for each type of yoghurt should be linked to the first screen of specific yoghurt type, and not be a separate part of the web site.
- The engineer responsible for the energy requirement information, felt that the user could be confused by the inclusion of links to both the summary and diagram on the first screen of the energy requirements. He suggested the removal of the link to the summary on the first screen and the inclusion on the diagram screen of the link to the summary.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

188

5.8.5.3   Content

Comments:

- The evaluators of Agrelek felt that the names and addresses of suppliers should also list the equipment they supply, to correspond to usage in the existing Agrelek database.
- At "Other Sites", a brief description should be included. The user need not visit them all but should be able to narrow the search.
- The "selection of size of processing" was mentioned only at one point but was not repeated.
- More sites were suggested for inclusion under "Other Sites".
- A list of frequently asked questions would be an advantage.

5.9 Interpretation of results and making changes to the web site

In this section responses will be interpreted, and determined which of them could be incorporated in the final version of the web site.

In the interpretation of the responses to the questionnaires, certain trends could be identified. These can be divided into four broad categories, which were:
- text design;
- screen design;
- navigation; and
- specific subject contents.

The interpretation of the results should be given within the context of these categories. The first three categories are similar to those discussed in the previous chapter on design.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

189

5.9.1　　　Text design

5.9.1.1　　Colour used for small scale processing

Some evaluators felt that the colour used for the small scale processing was difficult to read. The colour was changed to olive green to resolve this problem (figure 5.2). The initial colour was a bright green, but most of the evaluators claimed at that stage that it could not be read easily. Most of them commented on the colour, showing that bright colours draw attention.

Some evaluators mentioned that the indication of small, medium and large scale processing on some screens were not active links. It was initially planned to distinguish the sizes of processing by using different colours. As a result of these comments links were made to the specific scale of processing screen for small, medium or large scale (figure 5.2).

Some evaluators indicated that they could not find a description of how to determine the size of production. To provide for this links were provided on screens:

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

190

Figure 5.2 Small, medium and large scale processing links

5.9.1.2   Typographical errors

Typographical errors such as spelling mistakes and splitting of text lines were corrected.

5.9.1.3   Blank spaces

Some evaluators mentioned that blank spaces on some screens looked strange. These spaces in the central text column were the result of the length of the navigation bar on the left (figure 5.3). The navigation bars was of a standard length throughout the web site. It could therefore not be changed, because it appeared on every screen.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

191

Figure 5.3 Example of blank spaces on pre-heating screen
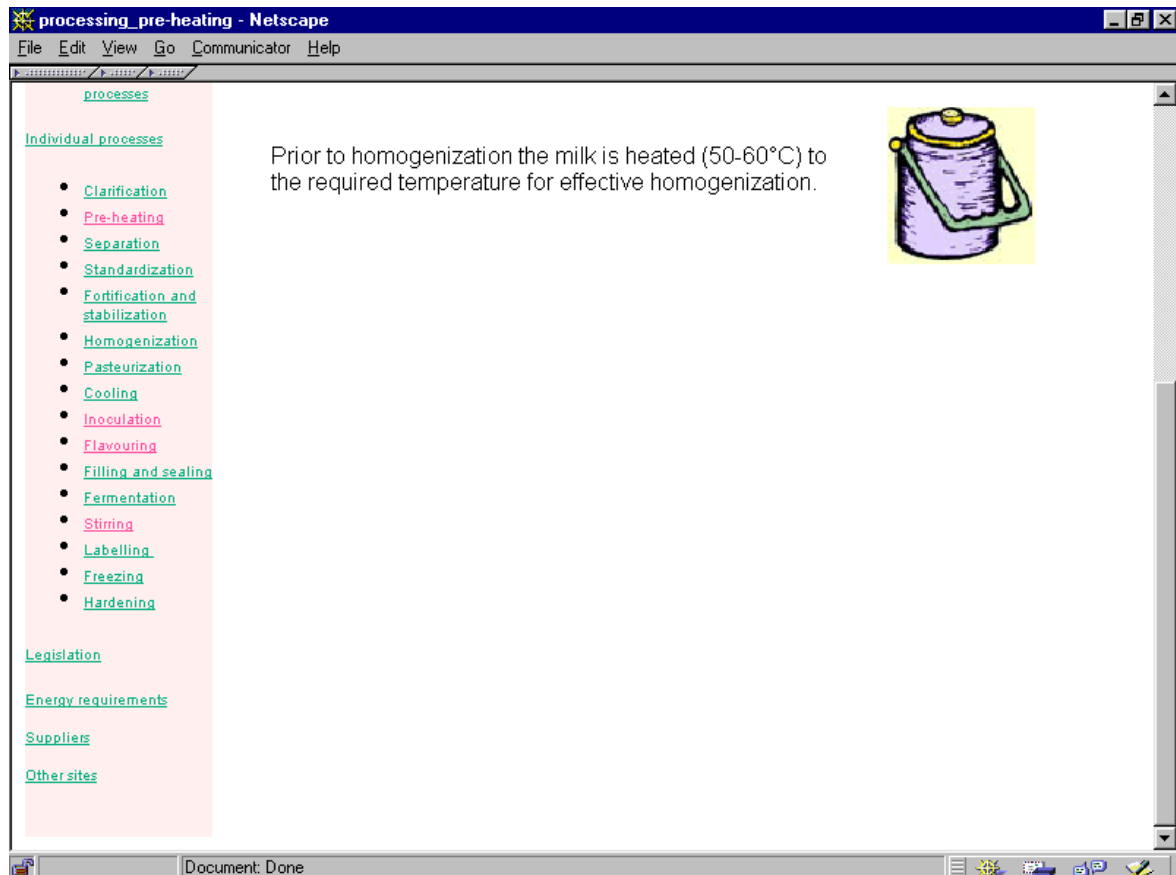
5.9.1.4   Font size

Problems experienced with the font size and the change of font within a paragraph were corrected by the inclusion of the <FONTFACE/ > HTML command on all the screens where embedded *Windows* and *Macintosh* fonts were specified (figure 5.4). The web site should then default to these values. Only when not available on the user's system, the default font of the browser should be used.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

192

Figure 5.4 HTML-codes of specified fonts

```
<font face="Arial, Helvetica, sans-serif, Verdana, Geneva">
</font>
```

5.9.2   Screen design

5.9.2.1   "Home to Quick tour" icon

One evaluator felt that the use of the "home to Quick tour" icon was inappropriate. This specific icon was used to draw attention and reduce possible anxiety by the user when searching for the home page. It was agreed that it did not really fit in with the rest of the site concept, where mostly New Age symbols and icons were used. The image was changed to a New Age symbol to harmonize with the rest of the site (figure 5.5).

Figure 5.5 Old and new "home to Quick tour" icon

Old   **New**

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

193
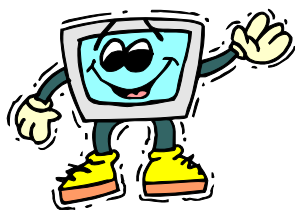
5.9.2.2 "Time-out" messages

Some evaluators experienced problems with a "time-out" message given by their computers. This could be attributed to either the server or the Internet connection. With this in mind, the site was duplicated on another web site (http://users2.50megs.helene) away from the Hagar server at the University of Pretoria (http://hagar.up.ac.za/catts/learner/game/1999/helene/yoghurt/index.htm). Evaluators were given both URLs or web addresses to ensure the availability of the site for evaluation at any given moment.

5.9.2.3 Date of production

The date of production and the name of the author was included in the site (figure 5.6).

Figure 5.6 Date of production and name of author

Comp   lete picture Quick tour

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

194

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

195

5.9.3   Navigation

5.9.3.1   "How to use this site" screen

It was decided that the home page of the site should not default to the index screen, but rather to the "how to use this site" screen. This screen contained the instructions on the use of the site, as well as a brief description of the alternatives (Quick tour or Complete picture) (figure 5.7).

Figure 5.7 "How to use this site" screen

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

196
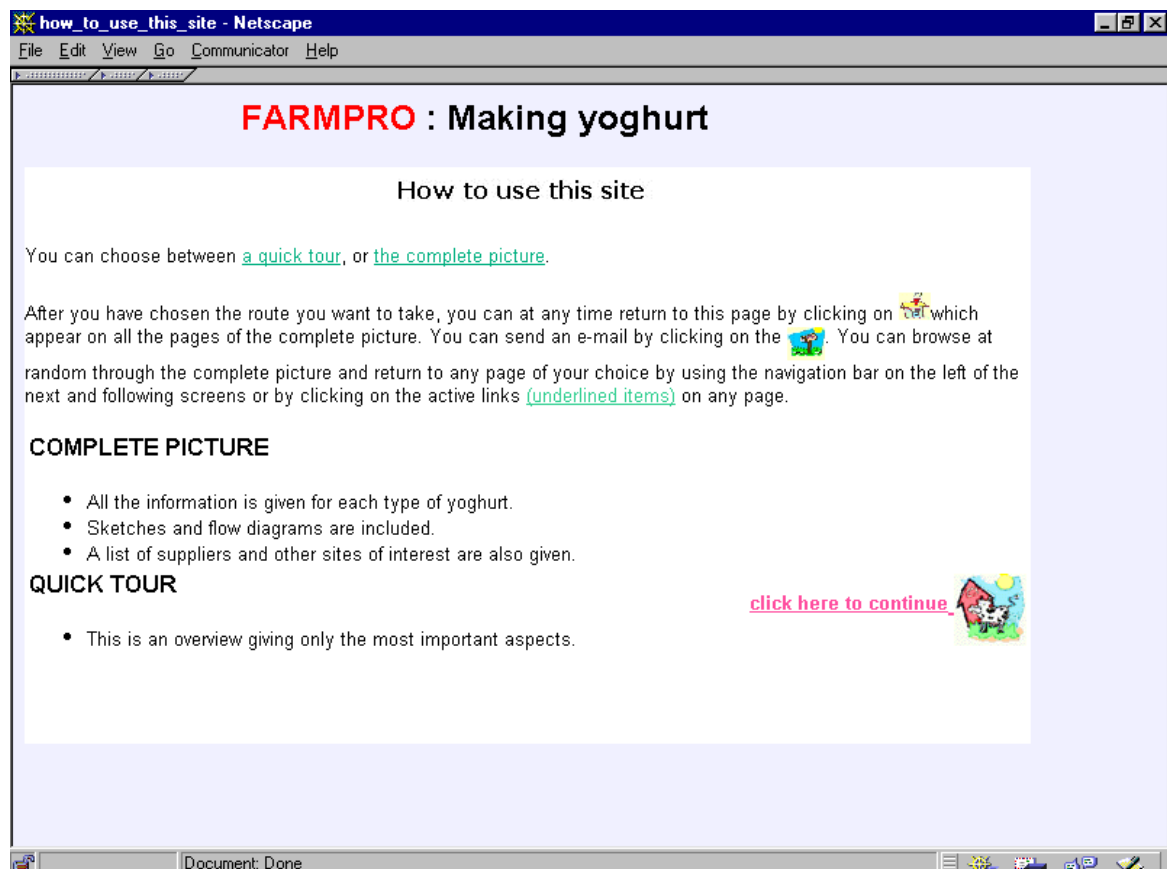
Comments by some of the evaluators made it clear that no time was spent to read the "how to use this site" screen was not read at all. This screen contained basic information about the site, its structure and ways in which the user could communicate with the author. A brief description of both the Complete picture and the Quick tour appeared on this screen. After they were referred back to the "how to use this site" screen, no further problems were experienced.

5.9.3.2   *Introduction screens*

The first few screens of the web site served as an introduction. The user then had to select one of two options, the Quick tour or the Complete picture. The display then changed to two different designs. The Quick tour screen had the title at the top and the text in a central block with the next button on the right-hand side of the screen. An "e-mail" icon and "home to Quick tour" icon appeared on the left-hand side (figure 5.8).

Figure 5.8 Screen design of Quick tour

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

197

The screen of the Complete picture was much more complicated. It has the title of the screen at the top, a navigation bar on the left of the screen, the text in the central part and an "e-mail" icon and "home" icon on the right side. Other graphics also appeared on the right side of the screen (figure 5.9).

Figure 5.9   **Screen design of Complete picture**

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

198
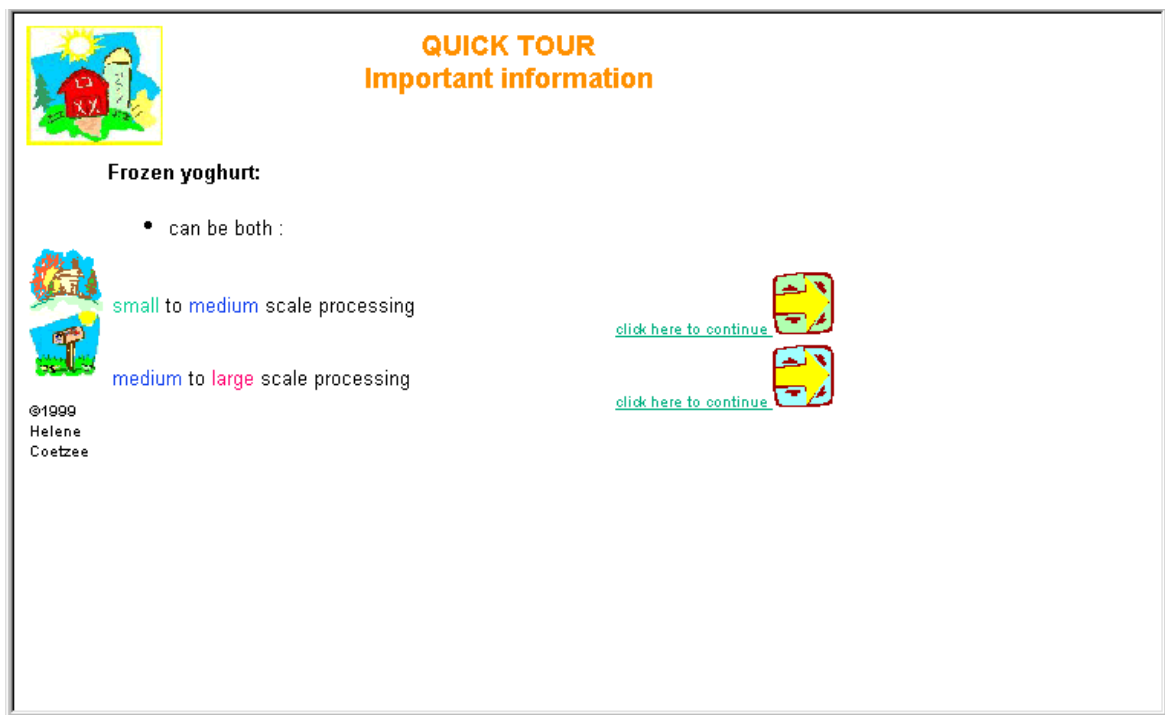
5.9.3.3   *Index screen*

On the initial web site an index screen with four buttons on the left and show-hide layers containing information relevant to the button were used. These layers became
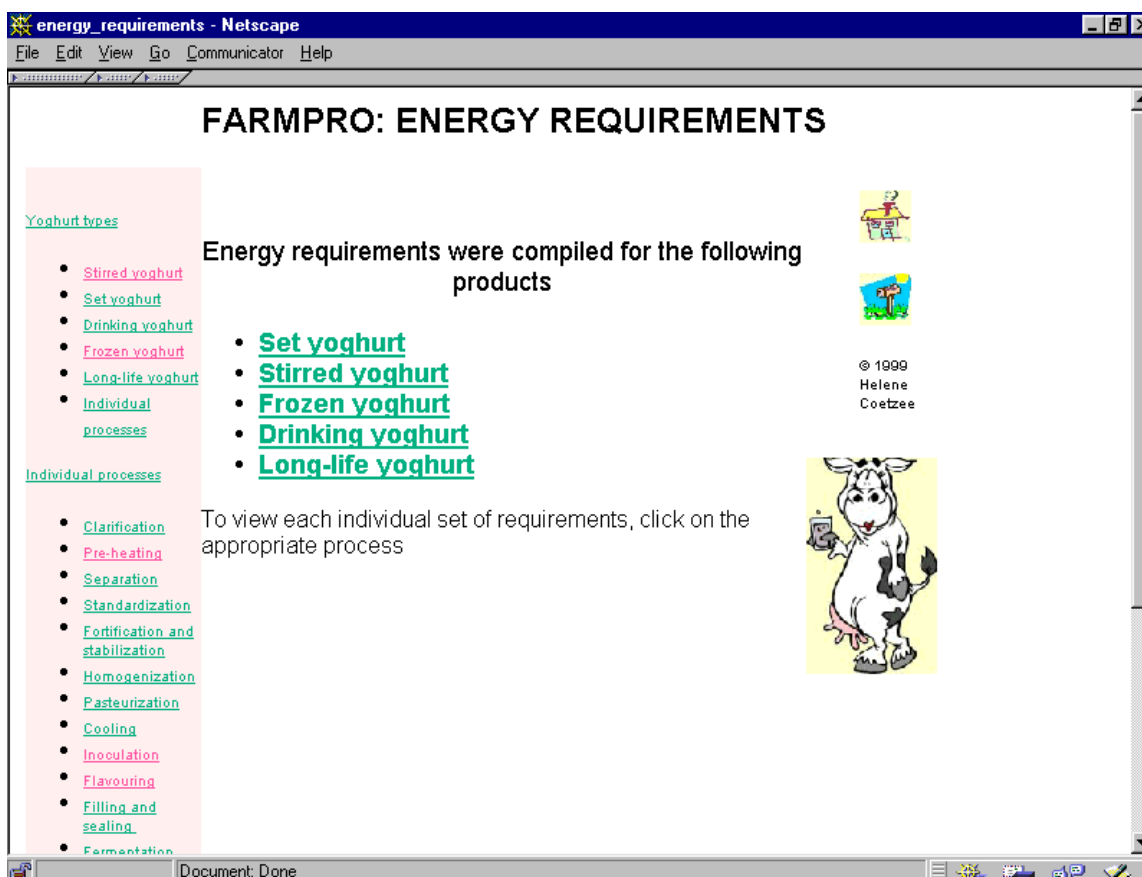
visible by moving the cursor across the button. Soon after posting the questionnaire, complaints were received that nothing was visible on that screen. On enquiry, the evaluators reported that they were using *Internet Explorer* which did not support the use of this facility. The screen had to be reconstructed with additional screens containing the information from the layers. These were then posted on both sites, and no further complaints were received.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

199

5.9.3.4 Time and number of clicks needed to get to essential information

Some evaluators complained about the time and number of clicks it took to get to essential information. One way of addressing this issue was the inclusion of HTML codes which automatically change from one screen to the next after a set time (5 seconds)(figure 5.10). This was implemented only for the first two screens where no essential information was included. When the user wanted to read the contents of a screen, a button was used as a link to the next screen. This puts the user in charge of the pace at which the information was accessed to read.

Figure 5.10   HTML codes for automatic change of screens

```
<html>
<head>
<title>indexbrowser4</title>
<meta http-equiv="refresh" content="5;URL=why_this_programme.htm">
</head>
```

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

200

5.9.3.5   *Browser capabilities*

Problems with the pop-up messages (ALT codes) of the icons, symbols, pictures and active spots clearly showed the difference between the various browsers. Evaluators with *Internet Explorer* could not see the pop-up messages (ALT codes) of the active spots on the diagrams. The only message readable was the title (ALT codes) of the diagram. The pop-up messages for symbols and icons were also not always visible. It was deduced that the web site was best viewed in *Netscape Navigator*. This suggestion should be made on the label of the CD-ROM.

The problems experienced by some users highlight issues raised earlier in the research, namely that the design of any web site had to take the most basic browser capabilities into account. It is important to ensure that the web site is "viewable" by as large a group of users as possible.   For this reason the newest "cutting edge technology" was not used. The screens consisted of tables with all the information, which should be viewable by most browsers and displayed exactly the same in most browsers. Frames and layers may differ in size and placement on the screen when different browsers are used.

5.9.3.6   *Use of frames*

Some users suggested the use of frames to enable the provision of a static screen which links to another screen displayed in another frame. It was decided not to use frames in the design of this web site, again based on the differences in browsers. Not all browsers display frames in the same way. Frames should be avoided as far as possible in web sites.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

201

5.9.4   Specific subject contents

5.9.4.1   *Absence of small scale processing equipment and flow diagrams*

Some evaluators commented on the absence of small scale processing equipment and flow diagrams. Where sketches and diagrams were available, they were added. The flow diagram used in the Complete picture was too big for one screen, and an attempt to change the diagram to something similar to the one used in the Quick tour was not successful. The flow diagram could not fit in on one screen and the user would have to scroll down to access all the information. It was then decided to retain it with minimal spaces between the text and arrows (figure.5.11)

Suggestions made by evaluators that the links of the flow diagrams on small to medium scale processing should be removed, were implemented in the final version. These links were now available as an alternative at the bottom of the flow diagram.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

202

Figure 5.11   Flow diagram for frozen yoghurt
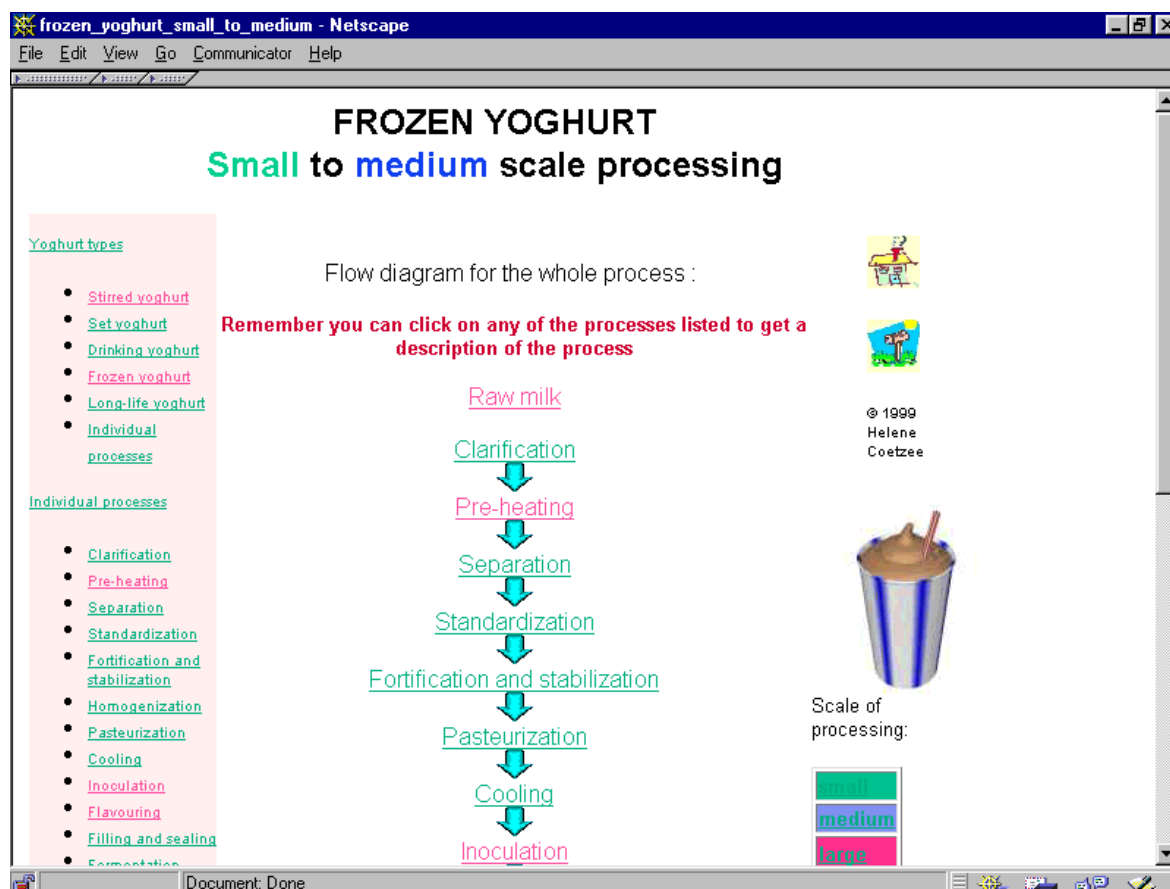
5.9.4.2   *Wording of definitions*

It was suggested that the wording of the definitions was too technical. All the information contained in this web site was taken from the existing Agrelek database on yoghurt and cannot be simplified. The definitions were general descriptions of the processes. In the Quick tour only this definition was given. In the Complete picture part of the web site, these definitions as well as a description of the process were given, with special reference to the scale of processing (small, medium or large).

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

203

5.9.4.3   Quick tour

For reasons explained earlier, the Quick tour was in a linear format, where the user had to work through the sequence of screens from start to finish. No additional information was given.   No navigation bar appeared in this part of the web site and it is not interactive. The Complete picture on the other hand was fully interactive and the users could decide where to go, at their own pace.

5.9.4.4   Energy requirements

The engineer responsible for the calculation of energy requirements suggested that to avoid confusion, the link to the energy diagram should be removed from the first screen. The first screen should link to the energy summary only. Only then should the user be able to access the diagram. It was also suggested that the user should use the summary in consultation with the local Agrelek adviser where possible. It was suggested that the first screen of each type of yoghurt should contain a link to the energy diagram of the specific type of yoghurt.

5.9.4.5   Printing

Some evaluators had problems when trying to print a specific screen. To resolve this the complete process for each type of yoghurt was included as a printable version. This was similar to the contents of the Agrelek database. These files were included as Rich Text Format (RTF) files, printable on most word processing programmes.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

204

5.9.4.6 Recipes

To enhance the web site further a number of recipes were also included as well as instructions for the preparation of yoghurt from soya beans.

5.9.4.7 Suppliers

Some evaluators expressed concern that they would have to phone all the suppliers to get information on equipment. To avoid this, it was suggested that the user can either contact their local Agrelek adviser for suppliers in their area, or Louis Lagrange of Agrelek in Glen for this information. The wording on the screen was consequently changed to indicate this (figure 5.12).

Figure 5.12   Last of suppliers

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

205

5.9.4.8   *Amount of information*

A complaint regarding the amount of information supplied and the time it takes to reach specific information should be seen against the background of users who are ignorant about using the World Wide Web as an education tool. Experience in using web sites, should enable users to overcome this obstacle. The nature of the web site makes it impossible to avoid supplying complete information.

5.9.4.9   *Other suggestions about additions to the web site*

It was also suggested that more recipes, a section dealing with frequently asked questions, tests, more "other sites" and pull down menus should be included.

As can be seen from the above discussion, attention was given to all comments and suggestions received from evaluators and changes and corrections made as far as possible.

5.10   Summary

Evaluation, as stated earlier, was an important and inherent part of the development process. Evaluation served as a feedback mechanism before a final product was made available. A combination of qualitative-anthropological and participant-oriented models was used for the evaluation of this web site. A combination of formative and summative evaluation was used. One-to-one evaluation, small-group evaluation and field test evaluation was incorporated. A questionnaire was drawn up and completed by evaluators.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

206

The evaluation of this web site was done by farmers, engineers, food scientists and novices. The evaluation took place over a period of a few weeks. Some problems were initially experienced with show-hide layers which were then rectified. The comments and suggestions made by the evaluators ranged from concrete suggestions to suggestions that fell outside the scope of this web site. Interpretation of the results showed that most of the comments were justified. Comments of an unproductive nature were disregarded and were not included. Suggestions made were incorporated in the final web site as far as possible.

Some suggestions were made relating to issues which could only be addressed in future web sites. A few dealt with issues that were not possible to implement in this prototype web site. The evaluation of this web site should result in a better product more streamlined and suitable for use by the intended target group.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

207

Chapter 6: Conclusions and recommendations

6.1 Introduction

The process of development contributed significantly to come to a better understanding of the information needs of dairy farmers, and how a web site should be developed to meet these needs optimally. Although much of the information was gathered while doing the literature review, much of it was not directly applicable and had to be adapted considerably. It was necessary to integrate and evaluate what was found for application within the scope of this study. A number of the hypotheses postulated in the research proposal, had to be changed or discarded. Some of the features of this web site cannot be changed at this stage, but what was learnt can serve as a guideline for future implementation.

In the first chapter, the following research problems were identified:

- the target group of this web site;
- information which is currently available to the target group;
- information needs of the target group;
- information to be included in the web site to meet the information needs;
- suitable ways of presentation of the information;
- design of the web site for effective transfer of information;
- evaluation of the web site; and
- adaptations to the web site after evaluation.

In this study an attempt was made to arrive at a solution to these problems. Experience gained from the literature review and the building and evaluating of the web site, has shown that there are a number of issues remaining to which

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

208

future research can pay attention. These issues will be discussed in this chapter.
Recommendations are mainly meant for implementation by Agrelek, because of their
involvement with the development of this web site, and also because they are in the
business of providing information to farmers. The Agricultural Research Council (ARC)
and other organizations involved in agricultural development, can however also do
much more to educate and inform farmers, and might also benefit from the results of
this study.

6.2 The target group of this web site

6.2.1   Who is the target group of this web site?

The target group selected for this web site was not identified scientifically. Experience
gained by Agrelek and its advisers were taken as a point of departure. Information on
agriculture in South Africa in general and the dairy industry in particular was also taken
into consideration when selecting a target group.

Dairy farmers, as well as those in other sectors of agriculture in South Africa, are
currently faced with changing circumstances. The dairy industry, like many of the
other agricultural sectors, is not regulated. Bulk buyers of milk set and control prices to
the disadvantage of small to medium scale producers. A large number of dairy farmers
no longer find it profitable to produce milk on a large scale and sell the raw milk they
produce at low prices. Due to poor economic conditions, dairy farmers are ready to
take almost desperate measures to ensure a regular income throughout the year by
manufacturing products on the farm.

Even if they consider exporting dairy products, they cannot compete with European
Union countries, where diary products are heavily subsidized. The strict hygiene

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

209

requirements set by the European Union which are difficult and expensive to comply with, especially when using existing facilities, also puts this option beyond the reach of many.

Farmers with surplus milk can however consider processing milk themselves. Many home industries and so-called "farmers' markets" offer opportunities for selling dairy products of a good quality directly to the public. Dairy farmers can even open their own small depots where milk and milk products can be sold to the public. Products can also be sold directly to retailers.

There are a variety of products farmers can make from milk. Raw milk has a very short shelf life but the shelf life of dairy products processed on the farm is considerably longer. Products that can be considered for web sites of this kind aimed at processing on the farm are: types of yoghurt, ice-cream, cultured buttermilk, caseinates prepared by roller drying, cultured milk (maas), kefir, hard cheeses like cheddar, processed cheese, cheese spread, semi-hard cheeses like gouda and feta cheese, cottage cheese, soft cheeses such as ricotta, cream, which can be whipping cream, whipped cream, dessert and coffee cream, and cultured or sour cream, butter and butter oil. Dairy farmers therefore have a large variety to choose from. After consultation with Agrelek, yoghurt was selected from the abovementioned as the best possibility for which a prototype web site can be developed, because a target group for information on yoghurt had already been identified.

6.2.2   Recommendations

To ensure that specific target audiences for future products are identified, a way must be found to do a survey of some kind before further web sites are developed. More information about products for which consumer demand exists or emerges, must also be collected as well as consumer preferences regarding specific tastes, colours and

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

210

other attributes. A list of priorities can then be compiled. It was also essential to make sure that the needs of the target audience were met by this web site, and if not, how it can be adapted to make future web sites more successful.

6.3 Information currently available to the target group

6.3.1   Which sources of information are currently available?

A number of sources are available to farmers, but there is no way to establish which sources are used and by whom and how useful information gained form these sources are. Many farmers read farming magazines, listen to the radio, watch television programmes and attend farmers' days. Some of them consult more official sources like agricultural extension officers. Agricultural advisers and extension officers are however often more concerned with correct farming practices, fertilization and soil preservation. They are seldom knowledgeable about the possible processing of raw products and can give no advice on matters of this kind. Textbooks and articles in scientific journals are also being bought or borrowed by farmers, but are mostly written in technical language. This is of little use to the majority of farmers.

As part of this study, two papers were presented in Durban and Cape Town at international conferences. As a result of the information on the prototype web site provided in these papers, a number of queries were received, asking for more information and showing interest in a web site as a possible source of agricultural information.

There is definitely not enough information available on processing on the farm. What is available is not easily understandable and cannot be applied by the average small to

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

211

medium scale farmer. Although information probably exists, it is not easily accessible for most farmers, and is seldom up to date.

Attempts were made to find out in what format what information on yoghurt making is actually available to farmers. Apart from technical books on dairy farming, articles in technical and popular journals and pamphlets compiled by the Animal Nutrition and Animal Products Institute of the Agricultural Research Council (ARC), it became clear that no suitable or complete source on yoghurt making is readily available to meet farmers' needs.

6.3.2 Recommendations

Information sources have to be specifically developed with the small and medium scale farmer in mind. Many of them have not achieved a high educational level and many emerging farmers, owning their own land for the first time, can hardly read or write. This has to be provided for by using simple language and pictures. Information on products suitable for making by this group of farmers also needs to be developed.

Methods included should also be within their reach as far as capital outlay and technology is concerned. Material can also be prepared to be used for group presentation by an instructor (for example Agrelek advisers and extension officers). Small to medium scale farmers can further be informed on ways they can cooperate and work together to achieve better results and farm more profitably.

Information sources must be marketed in as many ways as possible, for example: using radio and TV programmes, popular magazines, specialized journals, conferences, farmers' days and possibly also through agricultural or farmers' unions. All possible channels of communication with farmers must be explored and utilized. This will contribute to development, especially in rural communities.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

212

6.3.3   Is information available in a suitable format for farmers?

Suitable information is seldom readily available when required, and is not up to date or in a format that is easy to use. Although many farmers prefer asking friends, family or neighbours, there is a real need for authoritative information, especially before any costs are incurred.

As the provision of electricity to rural areas expands, Agrelek receives many queries regarding the processing of products on the farm. Agrelek has a considerable database on products farmers can make themselves. This is available to farmers through Agrelek advisers. This database is available on the Intranet of Eskom. The Agrelek advisers are spread throughout South Africa and have access to the database.

Many farmers, however, do not contact Agrelek for advice and prefer to find their own information. They also seldom consult agricultural extension officers for advice. Upon request of specific queries, a relevant section of the Agrelek database can be printed for use both by the Agrelek advisers and farmers. The format in which this information is presented, is meant to be used by advisers, but was not developed with the farmers themselves in mind. It often encompasses a large amount of information, which takes time to work through. It is of a technical nature and comprehensive, but does not meet the needs of the farmer. Agrelek does not readily supply printouts to farmers, but even if they do, the format is not easy to use, even by advisers. Advisers are mainly trained in the effective use of electricity in agriculture, but often have no knowledge of product selection and processing and cannot assist farmers in a meaningful way.

Other instructors and advisers giving advice to farmers are also not trained in aspects of food products and processing. This is the domain of food technologists and home economists, who are seldom involved in advising farmers. The now defunct control boards gave demonstrations, supplied recipe books and gave general advice to farmers

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

213

on processing, packaging and marketing of farm products. This gap has not been
filled.

6.3.4   Recommendations

There are electronic sources available on agricultural matters, but only a few are
created and maintained for South African farmers. The Agrelek database can also not
be regarded as available to farmers, because they have no online access to the
database.

The interactive way in which the web site was developed for the purposes of this
study, makes it an excellent format for farmers who have access to computers and are
computer literate. The CD-ROM version, if available at a reasonable price, could also
contribute significantly to making information readily available to more people.

It is necessary to provide all information needed for a particular purpose in a suitable
format which can easily be accessed by the user, in this case the farmer. The
information must be presented in a nonthreatening way broken down into
manageable chunks and using nonscientific language.

This web site is currently available only in English, but can be made available in other
languages as well. It can then be used at the new "telecentres" which are being built in
rural areas of South Africa and which will be used to promote development in these
areas.

Feedback can be provided and in this prototype web site an e-mail address
(farmpro_1999@yahoo.com) is provided. This link is available on every screen of the
document. Feedback in future web sites can also include other forms of assistance.
These can range from on-line help to small tests included in the system if an EPSS

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

214

system is used. Users can also be referred to other sources of information that might be helpful or links can be provided.

6.4 Information needs of the target group

6.4.1   What are the information needs of the target group?

Due to changes in agriculture and in the dairy industry in South Africa, additional needs are at present experienced by farmers. On a national level changes occurred in the marketing structure previously controlled by the control boards, new labour legislation requiring minimum wages for farm workers and land restitution. On an international level more markets became available for South African products, with the signing of the Free Trade Agreement between South African and the European Union.

Within the scope of this study, it was not feasible or possible to establish what farmers really need to know about yoghurt making. An attempt was made to come to an understanding of information needs of farmers and of dairy farmers in particular by studying and comparing findings found in the literature, both printed and on the Internet. Deductions were made about general needs. Also using this data, it was deduced what the specific needs of dairy farmers would be. The prototype web site is an attempt to meet as many of these needs as possible.

Input from officers of Agrelek was also used. Information on products already included in their database, compiled to meet the needs of their clients as made known through the advisers, was taken as an indication that a need for information on those products exists among diary farmers. From the dairy products in the database, yoghurt was selected. A wide variety of yoghurt types can be made. It is suitable for processing with small amounts of milk. Some can even be made in a microwave oven, making it

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

215

possible for a producer to experiment of a small scale before expanding. All aspects involved in the making of yoghurt on small and medium scale is included in the web site.

6.4.2   Recommendations

Possible sources should be identified that can be used to pinpoint the information needs of farmers more specifically, especially when developing web sites for other products in the future.

Channels already giving advice and information to farmers can be requested to gather information from farmers. A wide range of web sites and CD-ROMs could be developed and updated regularly. Web sites can also be developed on other helpful information, such as financing institution information, pricing of products, contact persons and suppliers of agricultural equipment. Agrelek, the Agricultural Research Council, farmer's unions and even agricultural journals can conduct surveys among farmers to establish which products they need information on.

6.4.3   Can information seeking models be used to establish the design and development of information retrieval systems?

There are various models available for establishing the information behaviour of users. Two of these were chosen, describing information seeking behaviour. The models clearly indicate that the need for information is but one aspect of information seeking behaviour as a whole. These models highlight communication and the problem solving process and can help to understand how information is sought. Models can serve a useful purpose in the effective design of a web site to ensure that all aspects are provided for and a logical sequence is followed, ensuring effective use.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

216

The models selected highlight the importance of allowing the user to search at his or her own pace. Feedback channels completing the circle are included. The models can also be related to the continuum of information seeking, where the user is initially in a state of uncertainty which leads to searching for information. It is only when this information is of value that knowledge is gained and the farmer moves to a state of certainty (knowledge). These models are ideally suited for describing the behaviour of the average users of a web site (mainly novice users seeking information in a technically complex environment).

6.4.4   Recommendations

Other models of information seeking behaviour can be considered and compared. Models available in general textbooks on information seeking behaviour have to be adapted for specific application. From a study of a variety of models, a new model (fig 6.1) was developed, specifically accommodating the identified target group.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

217

Figure 6.1 Information seeking behaviour of South African farmers
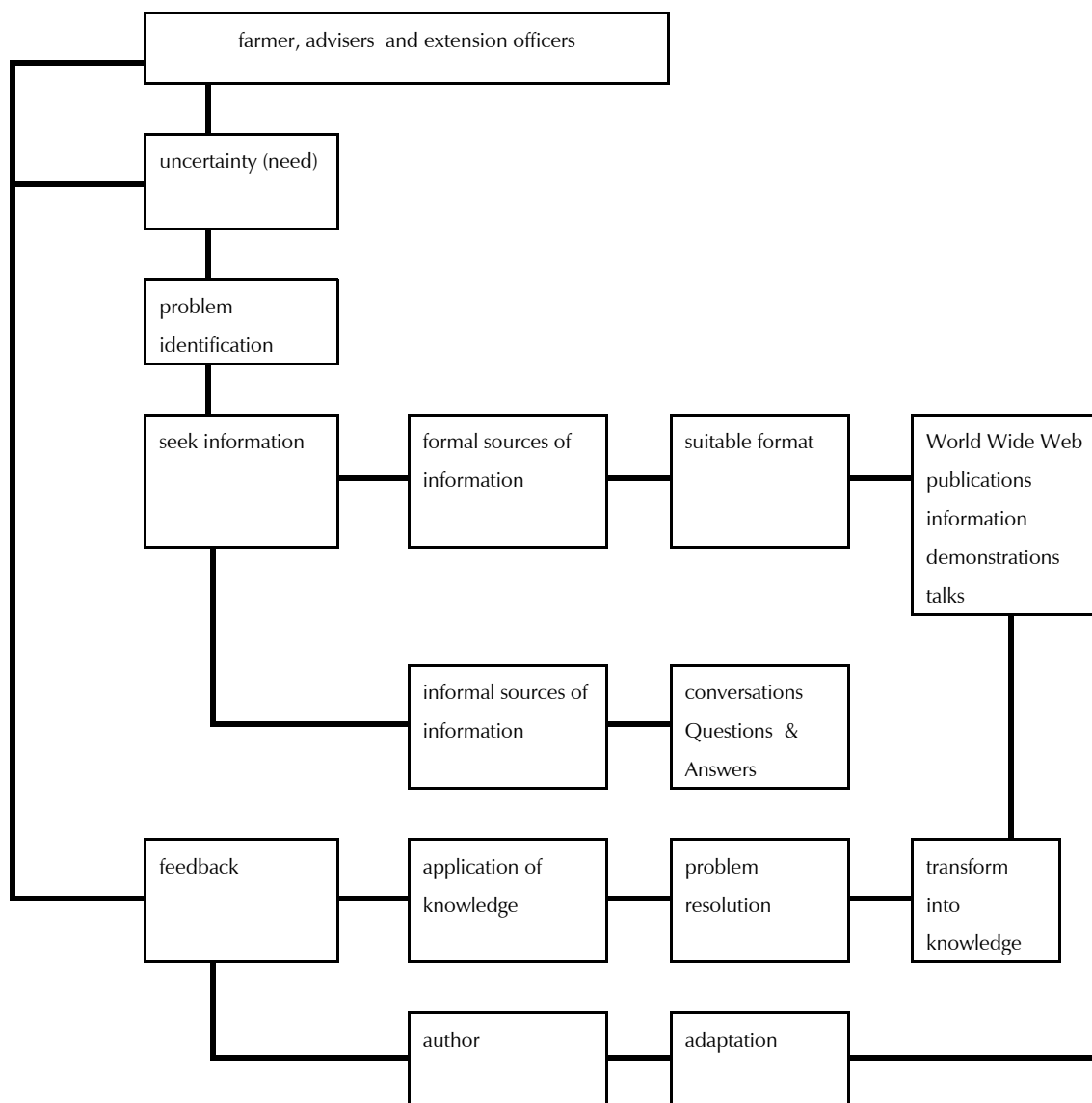
6.4.5   How can the information seeking behaviour of the target group be described?

As mentioned previously, farmers mostly rely on either their own experience or that of previous generations. They remember what and how things were done in the past and

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

218

follow that example. When considering something new they might have heard about on the radio or television or by word of mouth, they ask friends, neighbours and family. Printed sources are seldom consulted and many farmers do not even know where to obtain printed information, except for popular journals available in shops. Even if copies of these journals are kept, it is usually very difficult to find information published in previous issues. The chance that information will appear in a popular journal at the exact time a farmer might need it, is very slight. It might however happen that something he does read in a journal, will give him an idea, which can then be pursued further.

Farmers following modern agricultural practices, are more knowledgeable about communication channels available to them and will utilize them by writing or phoning appropriate organizations or people and ask for information or advice. Those with access to the Internet, will most probably look at web sites available there, but often still need more local content than is currently available. There are sites available to them and if known to them, they will probably visit these sites and follow leads obtained there. They need usable, practical information that can readily be understood and applied rather than information of a scientific nature. Web sites created by organization overseas, do contain information, but South African farmers will attach more importance to locally created web sites, using familiar terms.

## 6.4.6	Recommendations

Provision has to be made for the different approaches to information seeking identified, in order to meet the information needs of different groups interested in processing farm produce to make products. It is not within the scope of this study to make deductions on the information seeking behaviour of members of the informal sector and recommendations on how it would affect their use of information, as well as how their specific needs can be established, Of necessity, feedback from this sector

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

219

will have to be channelled through those who come into contact with them. For the more formal sector, especially the users of web sites, feedback must be made possible and used by authors of web sites. It must correspond with the information seeking behaviour of computer literate farmers and advisers to farmers. Widespread advertising of the web site and encouraging feedback will lead to an understanding of possible target groups, what they need and how they go about finding it. An adaptation of existing web sites to meet their needs as effectively as possible can then be developed. Existing South African web sites, that these farmers come into contact with, can also be used to make them aware of what is available and where it can be obtained. Agrelek advisers can also promote use of available web sites. Agrelek has its own web site where information on available web sites and CD-ROMs can be given.

6.5 Information to be included in the programme to meet information needs

6.5.1 Which features will ensure that this programme overcome obstacles in meeting information needs?

When developing this web site, it was decided that it should consist of two distinct parts, to make provision for two approaches by users of the web site.
The first part is called "Quick tour". It is in a linear format which compels the user to start at the beginning and work through all the information until the end. This is similar to Computer-based Training and it is not an interactive process. It is meant to given an overview to be scanned in the beginning of using the web site. It shows on which aspects information is given in the second part, which is called "Complete picture".

The Complete picture part is fully interactive and allows the user to direct his/her own information seeking. Options are given and after a choice has been made, information

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

220

required is shown. An empirical structure was used, which is structured to allow access directly to all information. The empirical structure can be used by both experts and novices. It allows the user to work from a central point, which is the home page, to which the user can return at any given moment by using the link present on all screens. It is a logical structure that is familiar to most users of web sites. The use of a navigation bar on the left, also makes it easy to reach relevant information. Icons and colour are also used to make the site more interesting and by consistent use, it also helps the user to find information. For example the icon for the home page is a New Age farmhouse and the New Age mailbox leads the user to the address where the author of the web site can be contacted.

Information in the site itself, also follows a consistent structure, making the place where information can be found predictable. The same headings are used for all products. For example the headings: kind of yoghurt is given first, followed by manufacturing methods, flow diagram, energy requirements, and so forth.

Every heading for a type of yoghurt is followed by description of that kind of yoghurt. Other information such as labelling requirements and suppliers of equipment, is linked to specific kinds of yoghurt.

### 6.5.2	Recommendations

The prototype web site was constructed using two kinds of structures, namely linear and empirical. Future web sites can be constructed to include only the empirical structure with added features. During the evaluation phase it became clear that the inclusion of some computer-based instruction methods will make this web site an excellent information source, especially for the Agrelek advisers. Various alternatives are available and each of these have advantages and disadvantages. A careful study of the literature and available resources, showed that the inclusion of an Electronic

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

221

Performance Support System (EPSS) could be the ideal solution. Using an EPSS, the web site will still supply the main stream of information, based on responses given or choices made by the user. In addition to this, EPSS has the ability to select certain pieces of information and a sequence of information based on the answers to questions or choices made by the user. He will however still have the choice of accessing other information not directly related to the choices made or the answers given. This will result in an interactive web site which can be accessed from various points, for example: after making a selection of questions, which form part of the EPSS structure, or through an open door, where the user can browse at his/her own pace through the information.

Future web sites including an EPSS system will increase the quality and usability of such a web site, because the inherent structure of EPSS helps the user to find required information, by collating bits of information. If EPSS is not used, the user has to find his own way, which takes longer and might not provide all needed information.

The use of EPSS will also address the issue raised by some evaluators complaining about the time taken to get to specific information. With an EPSS they will be able to reach specific information much quicker. Creating an EPSS web site is much more complicated than then one created for the purposes of this study. Appropriate technology is required and much more time will have to be devoted to the creation of such a web site.

Future web sites can also be more instructional in nature for certain types of users, by asking questions to which answers must be given before the user can go on. Some users might prefer having their knowledge tested, to make sure they comprehend everything before continuing. Computer literate users will probably be irritated by this kind of approach, and it will have to be excluded from web sites aimed at this target audience.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

222

6.5.3 What should the guidelines for selection of the content of the web site be?

It was quite difficult to decide what should be included in the prototype web site. It was not envisaged at the beginning that such a large amount of information was necessary. As the development progressed, it was realized that a simplified representation of information on yoghurt making would probably result in failure to produce quality products. Information had to include complete information on all aspects in order to be useful. All possible types of yoghurt that can be made and all processes and equipment are therefore included in the web site. Diagrams of equipment and energy flow were also added, following the advice of a number of agricultural engineers.

Because the farmer intends to produce a shelf ready product, it also has to conform to legal requirements. This information, quoting relevant regulations on labelling and the use of additives, such as flavourants, stabilizers, and preservatives are also supplied. A list of other laws and regulations affecting farmers indirectly, such as the Occupational Health and Safety Act is also included. Because the web site is aimed at helping farmers to process raw materials at a profit, it was decided to include an elementary business plan and feasibility study which can be done before any final decision is made. Possible sources of financing are also listed. A list of suppliers of equipment is also available.

6.5.4 Recommendations

Most evaluators were satisfied and enthusiastic about the content. More and continuous feedback by users should be encouraged to ascertain what more can be added, or what can be left out, to make this and future web sites more useful to more people.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

223

Instead of including some of the information, it can be considered to link other relevant web sites for users of the Internet. On the CD-ROM a list of related sites can be provided, with their URLs. A list of printed sources that can be used will also be an added advantage. A list of organizations and individuals involved in development projects who could be approached for help of all kinds, will further improve the usefulness of the web site.

6.5.5   How can the level at which information should be provided be determined?

The best level of information supplied can only be determined once the web site is fully functional and made available to all interested parties. Only after it has been used extensively will it become clear if the level chosen for this web site is acceptable. The present web site is complete, supplying all available information in the Complete picture part. The Quick tour is on another level and is aimed at giving an overview from which a prospective user can decide if he will be able to make yoghurt and select the type of yoghurt he can make with resources available or which falls within his means. It can, however, not be used to make yoghurt, because it does not contain complete information.

6.5.6   Recommendations

When more feedback about the web site becomes available, it can be considered to spilt the contents into products that can be made without having to acquire expensive equipment. This level will be aimed at beginners, who want to experiment on really small scale in their kitchens, before embarking on a bigger venture. It will also be useful as a development aid for upcoming farmers and should help him to make products within his means. It can depict processes graphically to make it easier to understand. All steps in processing will have to be included however to ensure success.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

224

The processes themselves cannot be simplified to represent a different level, but the way in which the information is presented can be simplified. Should it be considered to use a web site or CD-ROM for upcoming farmers of whom many are illiterate, a level using more graphics, not unlike material developed by the Agricultural Research Council at one time (Benza and Betty series), can be considered. It can be used under the direction of instructors, where information is projected on a screen and explained. Accompanying posters and leaflets can also be developed.

6.6 Suitable ways of presentation of information

6.6.1   What is the best delivery medium?

The Word Wide Web was selected as the most suitable delivery medium for this type of information. By using the World Wide Web, the web site can be accessed easily by users who have Internet access.

The World Wide Web is regarded as an established platform for presenting information. More and more users are accessing the World Wide Web daily, although the use of the Internet in South Africa is still not extensive. It is also a relatively cheap method of delivering information. The only cost incurred by the user is the cost of the telephone call, provided that the required software and hardware are available.

It was also decided to make a CD-ROM version available, because it can be used for other purposes as well. It can be sold to prospective users at a nominal price, which might prove to be cheaper in the long run than being connected to the Internet while looking for appropriate information. A printed version is also possible, although the size of the web site will make it bulky and expensive. Parts of the web site can,

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

225

however, be printed if required, for example on specific types of yoghurt. It will of course not include linked information.

Multimedia is defined as the integration of both text, sound, animation, video and graphics for the presentation of a programme or web site. Taking the probable target group of this web site into consideration, where only a percentage have Internet access, it was not deemed the best solution for this project, although the use of the multimedia attributes of sound and inclusion of video, would have made the web site much more attractive. This web site was written as a desktop multimedia programme, where only text and graphics were used so as to ensure viewability by the majority of probable users.

The programming language of the World Wide Web is HTML and was used for the creation of this web site. The HTML editor *Dreamweaver* was selected for use in creating the web site itself. A number of possibilities are available that can be used when designing HTML documents. Some are available freely on the web while others are reasonably expensive. *Frontpage* is a product of Microsoft and was considered for the development of this web site. *Dreamweaver,* a product of Macromedia was also looked at. Although *Frontpage* is used by many authors, it has limitations in freedom when designing specific screens. It forces the author to use templates.

Dreamweaver was chosen as a better option, because it allows greater freedom when designing screens within the framework of the limits set by the developer of the web site. Many of the features of *Dreamweaver* are unfortunately only suitable for viewing on the most recently developed browsers. The web site has a function that allows testing of the web site for usability in browsers three and lower.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

226

6.6.2   Recommendations

The use of the World Wide Web as an information tool is increasing daily. As more web sites are developed using HTML 4.0, with its improved capabilities, multimedia programmes will become increasingly user friendly and informative. Increasing use of web sites will inevitably lead to more web sites being developed.

Future web sites of the same type or in the same range as FARMPRO, can be enhanced by the inclusion of video, sound and animation to make it fully interactive multimedia. These must be included in such a way that even users with old machines will still be able to see the essential information even though video clips and sound will not be available to them. Video clips can include demonstrations of processes, show what a processing plant should look like, and, among others, give examples of finished products. The inclusion of sound may consist of interviews, rebroadcasts of radio programmes applicable to the specific product or commentary on agricultural matters. This will further enhance the value of the programme, where the user can hear other views and maybe even success stories. The inclusion of animation will serve a similar purpose as the video, where the flow diagram of any given process can be enhanced by actions suited to that process.

Dreamweaver has the ability to check browsers on the computer of a specific user, and select a branch of the web site for viewing on that computer. This will ensure that future web sites will be viewable by as many users as possible. Future web sites should also be written in *Dreamweaver* to ensure continuity with regard to interaction, basic outlay and general content, as well as familiarity to users.

The availability of a print version as part of the web site is also useful. The user will be able to keep this as reference work, without having to print screen by screen from the World Wide Web.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

227

The format of the final product must be compatible with the technological capabilities and abilities of the potential users and their equipment. This format was chosen as more computers are presently being used in farm management. Internet usage and access by farmers are also increasing. Making the information available on a CD-ROM ensures that it can be distributed to farmers with CD-ROM players. Agrelek advisers can take their laptop computers with a CD-ROM to farmers and show them the information. Information on a CD-ROM can also be used for group instruction by projecting information on a screen and explaining the concepts and processes.

If this web site and CD-ROM are advertized, it might also encourage more people to get Internet access. Instructors attached to organizations interested in development may also use it for instruction purposes.

6.7 Design of the web site for the effective transfer of information

6.7.1   Which factors must be taken into account when designing a web site?

Because of considerations discussed elsewhere, which relate to the envisaged target group for whom this web site was designed, fully interactive multimedia could not be used in the design. It was decided to use desktop multimedia, including only text and graphics. This decision imposed a number of limitations on the design of the web site.

A number of aspects must however be carefully considered when designing any web site to ensure effective transfer of information. These aspects were discussed in detail in a previous chapter. Choices were made at the beginning of the development of the site. Adaptations were made in the design after every stage of the evaluation to get the best possible product. Design and the subsequent "look and feel" of a site, is a subjective matter. An author must be prepared to be criticized on the use of colour,

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

228

typeface and layout. In the end is not possible to please everyone. Even if the author himself realizes at one stage or another that it could have been done in a more attractive or better way, it becomes impossible to make drastic changes to a web site of this size. The input of two different graphic authors was incorporated, but this does not guarantee customer satisfaction regarding design issues.

6.7.2   Recommendations

During the design of the web site many factors were taken into consideration to ensure a user-friendly usable web site making provision for the characteristics and preferences of potential users. Only continuous evaluation and comments by users will show whether it was successful. A balanced view of comments must be collected and those which can improve the web site must be incorporated. Once a web site with a distinctive appearance has become known, it might be advisable not to change it too much to ensure continuity. As technology advances more things become possible to improve the appearance of a site. Using fully interactive multimedia will also open up new possibilities for improving the web site.

6.8   Evaluation of the web site

6.8.1   How well is the web site working?

It was accepted from the beginning of this study, that the web site should have to be evaluated as thoroughly as possible, in order to determine how well the site is working. Decisions were made on guidelines from the literature, but only by using the web site will it become clear if the correct decisions have been made. Acceptability and usefulness for the purpose it was created have to be determined by people who are in

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

229

a position to give an informed opinion. The web site must prove to be fully functional.
 All links must work and the sequences of information have to be correct.

During the development process many changes had to be made on an ongoing basis,
as errors were picked up or as better ways of doing things came to light.

After completion of the web site it was formally evaluated, as described previously. At
each stage some changes were made in response to criticism and suggestions made by
evaluators. The first round of evaluation was done by classmates, but the web site was
in a very rudimentary form at that time and comments received did not prove very
useful. A variety of evaluators were involved after completion of the first prototype and
after every stage that followed. Some were to give an expert opinion on the content,
others to give an   expert opinion on the web site itself. A number of real novices were
also included, to give an idea of how a farmer, who is not very competent with a
computer and who is almost certainly not information literate, would use the web site.
The opinions of all three groups were rated equally important, because each group
used the site differently. A wide variety of comments were received. The correct
questions should be asked as well as careful observations made (Alessi & Trollip,
1991:384; Collis & Verwijs, 1995a: 12-14; Hawkins, 1999:1; Petersen, 1999:1-2;
Vaughan, 1994:24; Witt & Wager, 1994:23).   By far most of them were favourable. A
few snide comments also emerged. Because it is important to ensure that the
evaluators give an honest opinion, all comments were in their turn evaluated and
incorporated when possible. Evaluators were encouraged to give their **_honest_** personal
opinion. Some of them were family or friends who might have wanted to say what
they thought the author of the web site might want to hear, and not what they really
thought.

The web site was evaluated by evaluators, ranging from novices to dairy farmers
themselves and also including agricultural engineers. The majority of the evaluators

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

230

were people interested in or involved with processing of dairy products. The time allocated to the evaluation stage was not limited too strictly. Allowances had to be made for time constraints due to work or Internet access. The web site was evaluated over a period of time, with many evaluators returning time and again to look at the information. The web site is quite extensive and takes considerable time to work through. A language expert was asked to check for language and spelling errors. The consistent use of headings, font and typesize was also checked by someone who is knowledgeable on these matters.

Evaluators were asked to complete the evaluation form with a number of question listed and were also invited to make additional comments or suggestions. Many gave extensive comments on possible inclusions of other information or suggestions regarding layout, colour, and diagrams.

Feedback indicated that evaluators were able to access information and work through the web site at their own pace. Some complained that it took too long to reach what they called "essential" information.

6.8.2   Recommendations

The ideal would be to have the site evaluated under controlled conditions, but it was decided that this would not be good idea and would probably only work well for a homogeneous group of users, such as a group of dairy farmers. If a group of evaluators looked at the site simultaneously, as was the case with the classmates, people tend to influence each other, especially with negative comments. It also does not provide the opportunity for individuals to linger on a screen or to return to previous screens. Every individual has other preferences and looks at different aspects. For example, someone who is not really interested in making yoghurt, but would like to see how the site itself was designed, will want to skip the information on yoghurt making, while someone

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

231

interested in yoghurt making will probably not even notice design errors. Because the site was designed for use by individuals, it was deemed advisable to ask for volunteers to do the evaluation.

The evaluation stage of a web site must be planned carefully to ensure that it meets the needs envisaged as the reason for its creation in the first instance. It can also be useful to identify unexpressed and dormant needs which were not known at the beginning. It will also help to understand how the users actually use the information. Future web sites can then be adapted to make it acceptable to more users.

The groups of evaluators mentioned above, each evaluated the web site against their specific background, which is the ideal situation. The comments of some food engineers dealt mainly with the processing and with the energy flow diagrams, whilst some of the novices were not concerned so much with the details. They focussed on navigation through the web site, looking whether all links were working, and commented on problems with the font, colours used, and so forth. This underlines the importance of using a wide spectrum of evaluators for future web sites. The majority of evaluators must be from the intended target group, although experts able to judge other aspects of a web site must also be included to check the correctness of the information supplied and the way in which it is presented.

Ideally it should be possible to observe the human / information and human / computer interaction of the evaluators themselves. As objective evaluation is essential, the use of sound and video recordings might inhibit evaluators to give an unbiased opinion. Many people aim to please and might suppress unfavourable comments because the author of the web site is known to them. The best solution for objective evaluation, would be to have it done independently without the involvement of the developer of the web site. Questionnaires to be completed by evaluators can be extended and made more specific. If coded, it can be analysed statistically, giving more

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

232

specific results. Evaluators should also be selected using accepted methods of sampling to ensure that reliable information is obtained. The evaluation of this prototype web site was not done very scientifically, but it has shown which aspects can be improved when developing other web sites.

6.9 Adaptations to the web site

6.9.1　　Which aspects touched upon by evaluators will be changed in the web site?

Many of the comments from the evaluators were valid. Some however clearly showed the inexperience of the evaluators regarding web sites and navigation. Comments and suggestions of merit were used to adapt the programme. The questions in the questionnaire dealt with:

- content;
- navigation;
- ease of use; and
- overall impression.

The comments were analysed using these categories. It was not possible to incorporate every suggestion or change everything that was criticized. Changes were made as far as possible, taking feasibility and time constraints into consideration. The developer of the web site made some decisions which could not be changed without doing everything over from the beginning. Valid comments and suggestions were implemented in the final web site as far as possible. Some comments reflected a personal preference for certain colours and graphics. The look and feel of the final web site reflects the personal preference of the developer, and although probably not

Heléne Coetzee - 2000　　The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

233

the best, could not be changed too drastically, especially in the later stages of development.

Many of the suggestions dealt with specific issues, such as a font that is too small, too many empty spaces and links which led nowhere. These changes were made.

6.9.2   Recommendations

From studying design considerations in detail it was learnt that text, screens and navigation design are crucial to the success of a web site. The target group and their specific needs must be established and accommodated as far as possible in the design. It was necessary to go through a series of evaluations to determine what the shortcomings of the web site are to know which improvements can be made. Evaluation is essential to show if the web site is actually working in the way it should be.

Feedback highlights the importance of listening to the users of the web site and accommodating suggestions as far as possible. The developer is too involved and too close to the actual product and cannot be truly objective.   Evaluation must be heeded and not taken personally. Differences in preference will always exist. What is acceptable to one is not acceptable to another. Compromises are necessary to ensure that the final product is acceptable to the "*average*" user of the web site.

An EPSS system, a list of frequently asked questions and an on-line help function have been identified for inclusion in future web sites to make it more user orientated.

6.10   Conclusion

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

234

The development of this prototype web site showed that a remarkable amount of information is available that can serve as guidelines for development of a web site. Most information was found on the Word Wide Web, indicating that there is much interest in this form of disseminating information on a wide front.

Experienced gained by the development of this web site has clearly shown that the relationship between the users of information and the presentation of this information in a web-based format, must be understood to ensure that a usable and useful source of information is created. Research has also shown that information on the manufacturing of products on the farm by small and medium scale farmers, can be provided using a web site, even though use of the Internet is still limited amongst farmers in South Africa. In a recent report it was estimated that South Africa has about 90% of the total Internet users in Africa and that only about one in three persons or households have access to the Internet. This is a clear indication that there is still a long way to go before web sites can be regarded as a general information resource for farmers.

According to Holt (1991:533) agriculture will definitely benefit from the functional integration allowed by computerization. Organizational paradigms and mindsets will affect the rate at which computer-integrated agriculture is achieved. The concept of people exchanging information on a network will replace the concept of some groups supplying information to others. The development of web sites providing information should form an important part in the envisaged benefits to agriculture.

Researching the information behaviour and information needs of the end users of web sites are, and will remain crucial to ensure that products are created to meet particular needs. Some possible users of web sites of this kind are difficult to reach, but all possible attempts must be made to know the proposed target audience when developing a product to fulfil their needs. It is essential to understand the information itself, the users of that information, how they interact with the information and what

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

235

they expect to gain from using that information. Only then can appropriate technology be developed to create information resources of value to as many users of information as possible.

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

236

References

A beginner's guide to HTML. 1997. [On-line]. Available:
http://ncsa.uiuc.edu/General/Internet/WWW/HTMLPrimerAll.html

Adendorff, D. 1999a. Design specifications and ID blueprint. (University of Pretoria, Multimedia Winter School)

Adendorff, D. 1999b. Design principles. (University of Pretoria, Multimedia Winter School)

Advanced HTML Editors - CWSAPPS. 1999. [On-line]. Available:
http://cws.internet.com/16advhtml.html

Agrelek. 1999. [On-line]. Available: http://www.agrelek.co.za

Agricultural policy in South Africa : a discussion document. 1999. *Agricultural News,* 8 February 1999:2. (Also available on http://www.nda.agric.za)

Agricultural policy in South Africa: a discussion document. 1999a. *Agricultural News,* 8 March 1999:5. (Also available on http://www.nda.agric.za)

Agricultural policy in South Africa: a discussion document. 1999b. *Agricultural News,* 22 March 1999:4-5 (Also available on http://www.nda.agric.za)

Alessi, S. M. & Trollip, S. R. 1991. Computer-based instruction: methods and development. Englewood Cliffs, N J : Prentice Hall

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

237

Anand, P. G. 1998. Gagne's Eclectic Behaviourism. Class handout, Slippery Rock University College of Education. [On-line]. Available: http://www.sru.edu/depts/educatio/psycholo/panand/gagne.htm

Baldwin, B. 1998. Developing more sustainable systems of agriculture and natural resource management. *Presented at* 12th International Farm Management Congress, 18-24 July 1999, Durban South Africa

Barker, P. & Banerji, A. 1995. Designing electronic performance support system. *Innovations in Education and Training International,* 32(1):5-12

Basic HTML Editors - CWSAPPS. 1999. [On-line]. Available: http://cws.internet.com/16html.html

Bass, R. 1997. A brief guide to interactive multimedia and the study of the United States. [On-line]. Available: http://georgetown.edu/crossroads/mltmedia.html

Bates, A. W. 1995. Technology, open learning and distance education. London : Routledge

Boerdery het inligting nodig. 1999. [On-line]. Available: http://www.landbou.com/fin7mei99b.asp

Brent's big list of HTML editors. 1996. [On-line]. Available: http://user.aol.com/brentleim/htmledit.htm

Catsberg, C. M. E. & Kempen-van Dommelen, G. J. M. 1990. Food handbook. New York: Ellis Horwood

 Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

238

Children's software revue - software evaluation procedure. 1995. [On-line].
Available: http://microweb/com/pepsite/Revue/evaluation.html

CKSD software evaluation. 1999. [On-line]. Available:
http://www.cksd.edu/DIS/ap_f.htm

Claassen, J. 1999. VHO met EU kan miljarde spaar.   [On-line]. Available:
http://www.landbou.com/fin5mar99c.asp

Co-ordinated support for emerging and small-scale farmers. 1999. *Agricultural News,*
5 April 1999:3

Collaboration needed for home industries to succeed. 1999. *Agricultural News,* 8
March 1999:11

Collis, B. A. & Verwijs, C. 1995a. Evaluating electronic performance support systems: a
methodology focussed on future use-in-practice. *Innovations in Education and Training
International,* 32(1):23-30

Collis, B. A. & Verwijs, C. 1995b. A human approach to electronic performance and
learning support systems : Hybrid EPSS. *Educational Technology,* 35(1):5-21

Contribution of agricultural sector. 1999. *Agricultural News,* 9 August 1999:14-15

Craig, G. M. 1999.   Information available on agricultural websites. *ASLIB Proceedings,*
51(5):155-167

Cronjé, J. C. 1995. Multimedia: shaping the future of education.   [On-line].
Available: http://www.up.ac.za/catts/abchomes.html

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

239

Cronjé, J. C. & Barras Baker, S. J. B. 1998. Electronic performance support: appropriate technology for the development of middle management in developing countries. [On-line]. Available: http://www.up.ac.za/catts/abchomes.html

Cronjé, A. M., Jooste, A. & Dannhauser, A. P. 1999. Post-deregulation strategies for milk producers in South Africa *In* Proceedings of the 12th International Farm Management Congress, 18-24 July 1999, Durban South Africa: 237-254

Crosby, M. E. & Stelovsky, J. 1995. From multimedia instruction to multimedia evaluation. *Journal of Educational multimedia and hypermedia,* 4(2/3):147-162

Dairy Handbook. 1995. Sweden : Alfa Laval

Davies, G. & Samway, S. B. (*ed.*). 1993. TeleTeaching : Proceedings of the IFIP TC3 Third TeleTeaching 93 , Trondheim, Norway, 20-25 August. Amsterdam : North Holland

De Jong, T. & Sarti, L. (*ed.*). 1994. Design and production of multimedia and simulation-based learning material. Dordrecht : Kluwer Academic Publishers

Dobrovolny, A. 1995. Standards for the evaluation of instructional multimedia.   [On-line]. Available: http://www.cudenver.edu/~jdunlap/seminar/mm_standards.html

Douglas, I. 1998. Die landbourewolusie. *LandbouNet, bylae in Landbouweekblad*, 5 Junie 1998

Dreamweaver: using Dreamweaver. 1998. San Francisco : Macromedia

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

240

Dreamweaver information. 1999. [On-line]. Available:
http://www.macromedia.com/software/dreamweaver/

Dunbar, L. 1997. How leading companies use multimedia over Intranet. [On-line]. Available: http://www.netscapeworld.com/netscapeworld/nw-01-1997/nw-01-videointra.html

EPSS Infosite. 1999. [On-line]. Available:
http://www.tgx.com/enhance/whatepss.htm

Evaluating instructional computer courseware. 1998. [On-line]. Available:
http://eastnet.educ.ecu.edu/shofed/lset/6042/software.htm

Evaluation methodologies. 1998. [On-line]. Available:
Http://alcor.concordia.ca/~tbolton/edcomp/mod1b.html

Farmers must learn to think innovatively. 1999. *Agricultural News,* 22 March 1999(6):15

Fellows, P. J. 1988. Food processing technology: principles and practices. New York: Ellis Horwood

Five instructional software review forms. 1999. [On-line]. Available:
http://www.ecsu.ctstateu.edu/depts/edu/360/eval.html

Fleming, M. & Levie, W. H. (*ed.*). 1993. Instructional message design. Englewood Cliffs, N J : Educational Technology Publications

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

241

Flouris, G. 1989. The use of an instructional design model for increasing computer effectiveness. *Educational Technology,* 19(1):14-21

Frank, R. C.   1987. Agricultural information systems and services. *Annual Review of Information Science and Technology (ARIST),* 22:293-334.

Fraundorf, M, 1999. What is multimedia?   [On-line]. Available: http://www.coe.uh.edu/~mcf/whatis.html

Free HTML editors. 1999. [On-line]. Available: http://www.homeworlds.com/freesoft/editors.htm

Gery, G. 1987. Making CBT happen. Boston, Ma : Weingarten Publications

Gery, G. 1991. Electronic performance support systems. Boston, Ma : Weingarten Publications

Gery, G. 1995. The future of EPSS.   *Innovations in Education and Training International,* 32(1):70-73

Hannafin, M. J. & Peck, K. L. 1988. The design, development and evaluation of instructional software. New York : Macmillan

Harris, R. 1997. Evaluating Internet research sources.   [On-line]. Available: http://www.sccu.edu/faculty/R_Harris/evalu8it.htm

Hawkins, C. H., Gustafson, K. L. & Nielson, T. 1998. Return on investment (ROI) for electronic performance support systems : a web-based system. *Educational Technology,* 38(7-8):15-21

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

242

Hawkins, D. T. 1999. The WWW-VL is an outstanding comprehensive resource on web site quality... *ONLINE,* 23(5):51-55.   (Also available at http://www.vuw.ac.nz/~agsmith/evaln/evaln.htm   or http://www.onlineinc.com/onlinemag/OL1999/technomonitor9.html)

Heckel, P. 1982. The elements of friendly software design. San Francisco : SYBEX

Holt, D. 1991.   Computer integrated agriculture *in* Automated agriculture for the 21st century, Proceedings of the 1991 Symposium, 16-17 December 1991, Chicago, Illinois. 1991. Michigan : American Society of Agricultural Engineers

Howard, J. T. & Terry, R. V. 1997. A systems approach and instructional design principle: two critical elements for effective WWW courseware development.   [On-line]. Available: http://ww.uvm.edu/~hag/naweb97/papers/howard.html

HTML editors. 1999. [On-line]. Available: http://people.clarityconnect.com/webpages/sjs23/shtml.html

HTML 4.0 Specification. 1998.   [On-line]. Available: http://www.w3.org/TR/REC-html40/

Hypertext Markup Language. 1997.   [On-line]. Available: http://wombat.doc.uk/foldoc/foldoc.cgi?query=HTML

Hypertext. 1999.   [On-line]. Available: http://aj.encyclopedia.com

Improved food security depends upon adequate training. 1999. *Agricultural News,* 3 May 1999:3

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

243

Instructional software evaluation factors. 1998. [On-line]. Available: Http://www-personal.umich.edu/sdbest.techplan/maps/App_e.htm

Internet demographics. 1999. [On-line]. Available: http://nservices.com/internet.htm

Introduction to HTML 4.0. 1999. [On-line]. Available: http://www.w3.org/TR/REC-html40/intro/intro.html

Jones, M. G., & Okey, J. R. 1995. Interface Design for Computer-based Learning Environments. [On-line]. Available: http://www.hbg.psu.edu/bsed/intro/docs/idguide/

Jordaan, J. C. 1999. Hoe lyk die landbou vorentoe? Landbou 2000. *Landbouweekblad,* 119:22 Oktober 1999:46-69

Kaniki, A. M. 1992. Meeting the needs of agricultural researchers in Africa: the role of unpublished reports. *Information Development,* 8(2):83-89

Kaufman, R. 1988. Needs assessment : a menu. *Educational Technology* 18(7):21-23

Kerr, J. 1998. Software evaluation. [On-line]. Available: http://www.ed.brocku.ca/~jkerr.sftwreva.htm

Kirsten, J., Van Zyl, J. & Bayley, B. 1998. Agricultural deregulation. *South African Food Review,* 25(2):54-57

Klair, K., Boggia, A. & Richardson, D. W. 1998. The changing information needs of farmers in the U S and Europe in Joint conference on food, agriculture and the

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

244

environment (6th : 1998 : Minneapolis, Min).   [On-line]. Available:
http://agecon.lib.umn.edu/mn/c6klai01.html

Klein, M. 1999. EU accord will give SA firms competitive edge. *Sunday Times, Business Times,* April 4 1999:1.

Kunz, W., Rittel, H. W & Schwuchow, W. 1976. Methods of analysis and evaluation of information needs. München : Verlag Dokumentation

Lagrange, L. 1995-1999. Personal communications

Lappas, P. D. & Kekkeris, G. 1996. Multimedia Guide.   [On-line]. Available:
http://thrace.ee.duth.gr/multi/tableng.html

Le Page, D. 1999. The new untouchables .. On the Internet. *Mail & Guardian,* April 1 to 8, 1999:31

Leach, P.   1999. The provision of information to adults in rural KwaZulu-Natal, South Africa, by non-governmental organizations *Libri,* 49:71-89

Leighton, C. 1999. What is an EPSS?   [On-line]. Available:
http://itech1.coe.uga.edu/EPSS/Whatis.html

Letshela, Z. 1999. Developing a web-based agricultural community information centre for rural farmers *presented at :* Annual conference on World-Wide Web applications: preparing for the new millennium held at Rand Afrikaans University (2-4 September 1999)

Light, N. 1989. Longman illustrated dictionary of food science. New York: Longman

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

245

Marion, C. 1999b. What is Interaction design? Part 1 of 2.   [On-line]. Available: http://www.chesco.com/~cmarion/PCD/WhatIsInteractionDesign.html

Mayer, R. E. & Gallini, J. K. 1990. When is an illustration worth ten thousand words? *Journal of Educational Psychology,* 82(4):715-726

Miller, B. 1996. EPSS : expanding the perspective.   [On-line]. Available: http://www.epssinfosite.com/define.htm

Millheim, W. D. & Harvey, D. M. 1998. Design and development of a world wide web resource site. *Educational Technology,* 23(1-2):53-56

Multimedia : why use multimedia. 1997. [On-line]. Available: http://home.att.net/~arlington/6mm2.htm

Multimedia. 1999. [On-line]. Available: http://aj.encyclopedia.com

Murrell, K. 1999. A guide to HTML.   [On-line]. Available: http://www.und.ac.za/users/murrell/classrm/htmlg.html

Najjar, L. J. 1996. Multimedia information and learning. *Journal of Educational Multimedia and Hypermedia,* 5:129-150. (Also available at http://mime1.marc.gatech.edu/mime/papers/multimedia_and_learning.html)

Nicholas, D. 1996. Assessing information needs: tools and techniques. London : Aslib

Nicholas, D., et al. 1999. Developing and testing methods to determine the use of web sites: case study newspapers. *Aslib Proceedings,* 51(5):144-154

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

247

Nickerson, J. T. R. & Ronsivalli, L. J. 1982. Elementary food science, 2nd ed. Westport: AVI

Nielsen, J. 1997. How users read the web. [On-line]. Available: http://www.useit.com/alertbox/9710a.html

Nielsen, J. 1996a. Top ten mistakes in web design. [On-line]. Available: http://useit.com/alertbox9605.html

Nielsen, J. 1996b. Why frames suck (most of the time). [On-line]. Available: http://www.useit.com/alterbox9612.html

Ozowa, V. M. 1995. Information needs of small scale farmers in Africa: the Nigerian example. *Quarterly Bulletin of the International Association of Agricultural Information Specialists, IAALD.CABI,* 40. (Also available at: http://www.worldbank.org/html/cgiar/News,letter/june97/9nigeria.htm)

Petersen, M. G. 1998. Towards usability evaluation of multimedia applications. *Crossroads- the ACM's first electronic publication.* [On-line]. Available: http://www.acm.org/crossroads/xrds4-4/usability.html

Pickering, D. C. (*ed*). 1987. African agricultural research and technological development: Proceedings of a High-level Meeting in Feldafing, Federal Republic of Germany, September 24-27, 1987. Washington : The World Bank

Potter, N. N. & Hotchkiss, J. H. 1995. Food Science, 5th ed. New York: Chapman & Hall

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

248

Prasad, H. N. 1992. Information needs and users. Varanasi : Indian Bibliographic Centre

Price, R. V. 1988. Computer-aided instruction : a guide for authors. California : Brooks/Cole Publishing company

Professional strategies for teaching, 6-12 (ED 405): evaluation of instructional software. 1998. [On-line]. Available: http://www.lcsc.edu/ed405/sftrev.htm

Profit by small-scale processing. 1998. *South African Food Review,* 25(9):43

Promote international competitiveness of farmers. 1999. *Agricultural News,* 22 February 1999:6

Promotion and marketing important for trade relations. 1999. *Agricultural News,* 8 February 1999:1-2

Raggett, D., Le Hors, A. & Jacobs, I. 1998. HTML 4.0 Specification - W3C recommendation. [On-line]. Available: http://www.w3.org/TR/REC-html40/

Raggett, D. 1998. Raggett's 10 minute guide to HTML.   [On-line]. Available: http://www/w3/org/Markup/Guide

Raiken, M. D., Kill, R. C. & Baker, C. (*ed.*). 1998. Food industries manual, 24th ed.. New York: Chapman & Hall

Raybould, B. 1995a. Performance support engineering: an emerging development methodology for enabling organizational learning. *Performance Improvement Quarterly,* 8(1):7-22

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

249

Raybould, B. 1995b. Making a case for EPSS. *Innovations in Education and Training International,* 32(1):65-69

Reeves, T. C. 1994. Screen design guidelines

Reeves, T. C. 1993. Evaluation tools. [On-line]. Available: http://mime1.marc.gatech.edu/MM_Tools/

Remmers, E. 1998. Guidelines for WWW-based support environments for education professionals. [On-line]. Available: http://users.edte.utwente.nl/remmerse/litstudy/

Rettig, J. & LaGuardia, C. 1999. Beyond 'Beyond Cool': reviewing web resources. *ONLINE, 2*3(4):51-55

Rible, J. 1999. Web graphic software packages for dummies. *ONLINE,* 23(4):1-5. (Also available at http://www.onlineinc.com/onlinemag/OL1999/rible9.html)

Rosenthal, I. 1991. Milk and dairy products : properties and processing. Basel : VCH

Ross, T. W. 1993. Bloom and hypertext: parallel taxonomies? *ED-TECH Review,* Autumn/Winter:11-16

Rothwell, J. (*ed.*). 1989. Cream processing manual. Huntingdon: Society of Dairy Technology

SA/EU free trade agreement. 1999. *Agricultural News,* 17 May 1999:5

SA-EU deal to be implemented by 2000. 1999. [On-line]. Available: http://fin24.com/money/News,2/topstory.asp

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

250

Scales, G. R. 1998. Trends in Instructional Technology: Educational reform and electronic performance support systems.   [On-line]. Available: http://inforserver.etl.vt.edu/coe/COE_Students/Glenda/aect.html

Schwier, R. A. & Misanchuk, E. R. 1993. Interactive multimedia instruction. Englewood Cliffs, N J : Educational Technology Publications

Sherry, L. & Wilson, B. 1996. Supporting human performance across disciplines : a converging of roles and tools. *Performance Improvement Quarterly,* 9(4):19-36.

Slabber, G. 1999. Dis net die begin - die vloedgolf kom nog. *IT* bylae tot Die Burger, Beeld, Die Volksblad, 12 October 1999:5.

Sleight, D. 1993a. Types of electronic performance support systems: their characteristics and range of design. [On-line]. Available: http://www.siweb.com/staff/dsleight/PSS.htm

Sleight, D. 1993b. What is electronic performance support and what isn't?   [On-line]. Available: http://www.siweb.com/staff/dsleight/epss_yn.htm

Sloss, A. 1995. The integration of multimedia technology into and educational environment has started to slowly develop at the University of Waterloo.   [On-line]. Available: http://fpg.uwaterloo.ca/projects/eng04/eng04.html

Small-scale farming constraints. 1999. *Agricultural News,* 8 March 1999:10.

Small-scale processing may be a viable option. 1999. *South African Food Review,* 26(3):25

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

251

Smith, A. G. 1999. Evaluation of information sources.   [On-line]. Available:
http://www.vuw.ac.nz/~agsmith/evaln/evaln.htm

Software evaluation procedure. 1998.   [On-line]. Available:
http://www.cksd.wednet.edu/DIS/softeval.htm

Software evaluation criteria. 1998. [On-line]. Available: http://www.
usca.scarolina.edu/AEDC4...tes/Software_Evaluation_Criter.html

South Africa : Foodstuffs, Cosmetics and Disinfectants Act (No 54 of 1972) and
regulations. Johannesburg : Lex Patria

South Africa : Agricultural Products Standards Act (No 119 of 1990) and regulations.
Pretoria : Government Printer

Stratfold, M. & Laurillard, D. 1993. Towards a new grammar of multimedia.
Educational Multimedia & Hypermedia Annual 1993

Strengthen link between research and extension. 1999. *Agricultural News,* 28 June
1999:12

Sveiby, K-E. 1998. What is information? [On-line]. Available:
http://203.32.10.69/Information.html

Tamime, A. Y. & Robinson, R. K. 1985. Yoghurt science and technology. Oxford:
Pergamon Press

The Information needs of SMEs and the Internet. 1998.   [On-line]. Available:
http://europa.eu.int/en/comm/dg23/eic/internet_en.htm

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

252

Tognazzini, B. 1999. AskTog.   [On-line]. Available:
http://www.asktog.com/readerMail/1999-08ReaderMail.html

Trochim, W. M. 1999. The research methods knowledge database, 2ⁿᵈ ed.   [On-line]. Available: http://trochim.human.cornell.edu/kb/index.htm

Uncertainties in EU negotiations ironed out. 1999. *Agricultural News,* 31 May 1999:4-5

Upton, M. 1997. African farm management. Cambridge : Cambridge University Press

Van Zyl, J. 1998. SA boere word topsakelui. *Finansies & Tegniek,* 50/49:11 Desember 1998

Van Niekerk, R. V. 1993. Communication of agricultural information in South Africa. *South African Journal for Library and Information Science,* 61(1):19-27

Van Burick, N. 1999. Die SA Suiwelbedryf moet 'meer mededingend wees'. *Sake-Beeld,* 6 Augustus 1999:4

Vaughan, T.   1994. Multimedia: making it work, 2ⁿᵈ ed. New York : McGraw-Hill

Vaughan, T.   1998. Multimedia: making it work, 4ᵗʰ ed. New York : Osborne/McGraw-Hill

Waldeck, C. 1999. Instructional screen design. (University of Pretoria, Multimedia Winter School)

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

253

What is the difference between JPEG, GIF and PNG? 1998.   [On-line]. Available: http://www.ee.surrey.ac.uk/FAQ/standards.html

Why use multimedia? 1998. [On-line]. Available: http://www.pwrs.com/whymm.htm

Why use multimedia? 1997. [On-line]. Available: http://home.att.net/~arlington/6mm2.htm

Why use multimedia training? 1999. [On-line]. Available: http://www.learning.com.au/whyuse.htm

Willemse, J. 1999.   Goeie alternatiewe vir EU.   [On-line]. Available: http://www.landbou.com/new_fin.asp

Wilson, T. D. 1999. Models in information behaviour research. *Journal of Documentation,* 55(3):249-270

Witt, C. L. & Wager, W. 1994. A Comparison of instructional system design and electronic performance support system design. *Educational Technology,* 34(7-8):20-24

Heléne Coetzee - 2000   The development of a World Wide Web information resource for farmers with specific reference to yoghurt production

254

D.Phil. (Information Science), title: "The Development of a World Wide Web Information Resource for Farmers with specific Reference to Yoghurt Production" under the direction of Prof J C Cronjé. Available http://home.global.co.za/~helenebl/farmpro/