Chapter 3

Design, Development and Implementation

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3.1   Introduction

This chapter describes the design, development and the production of the multimedia program. The different phases in the development process will be described. A model by Alessi and Trollip (1991:245) was used as guide line for this study.

The importance of the different stages in the development of a program are accentuated by the following quotations:

> "The design step is critical to the effectiveness of the lesson."
> (Alessi & Trollip, 1991:293)

> "Far less important than the number of steps involved in creating CBT is the realisation that there are discrete steps at all"
> (Gery, 1988:88)

> "It guides the designer to systematically plan, develop, implement and evaluate the attainment of intended learning outcomes by learners."
> (Flowre, 1988:22)

The stages in the development of the program were categorized in analysis, design, development and production. (Reeves, 1997) All the activities conducted during these phases are set out in Table 3.1.

Table 3.1   Stages in the development process of the program

Stages and Activities	Output
Analysis	
Conduct analysis	
◆ Goal	• Effective learning and communication for students and lecturers.
◆ Target group	• Students in different year groups • Lecturers
◆ Content	• Supplied by client
◆ Project	• Project plan/structure • Develop the site
◆ Media	• Text, hypertext, graphics, animation
Design	
◆ Objectives/outcomes	• Design the proper tools for effective communication • Screens that will gain attention and stimulate learning through the use of colour, style of the layout, use of graphics and animation.
◆ Delivery system	• WWW (Web) • CD-ROM will be a hand out at the Program in Interior Design.
◆ Sequencing of content	• Primary and secondary content. • General and specific content. • Site map that will include all possible navigation.
◆ Design specifications	• These specifications are discussed in the Literature Review. • Individual screens discussed with regard to specifications mentioned. • Statistically designed questionnaires for students and lecturers.
◆ Design evaluation instrument	• Questionnaire (convenience sampling) without statistic data.
Development	
◆ Authoring tool	• *Dreamweaver Vs Front Page*
◆ Planning/ Storyboarding	• Paper
◆ Prototype	• 1.44/ Stiffy • CD and WWW
◆ Formative evaluation (Phase 1 - 4)	• User comments. • Suggestions from the client. • Expert advice. • Adapting prototype
Production	
◆ Multimedia product on computer in *Dreamweaver*	• Web site available on different URL's. • Available on Stiffy and CD • Ready for evaluation.

3.2   Stage 1: Analysis

The analysis stage describes the **purpose, limitations, methods, instruments** and **samples** used for the research.

A guide for the analysis was taken from an analysis report template of Reeves (1994) and the stages are described in detail throughout the chapter. To conclude this stage, **results** from the analysis are provided.

The **result of the needs analysis** provided the opportunity to develop an Internet-based information resource to assist students and other involved individuals to ensure effective communication and learning.

3.2.1   Purpose

According to Reeves (1997) the purpose of a needs assessment analysis is to confirm the existence of needs or clarify the nature of needs that others have perceived. Reeves believes that an **Analysis Report** will ensure a clear, readable, and concise presentation of the results of the analysis activities.

Table 3.2 summarizes the different analysis and the purpose of each analysis.

Table 3.2   Purpose of the Analysis stage

Analysis	Purpose of each analysis
Goal analysis	• To describe effective information gaining (learning) through an Internet based information resource. • To describe the communication of students with other students and students with lecturers through convenient and comfortable channels.
Target population analysis	• To clarify the demographic situation of the students. • To specify the needs of the students in terms of information and communication. • To identify their level of computer skills. • To determine their average age, their gender and language preference.
Content analysis	• The client provides all the content. • To present the content in an effective manner in order to promote the use of the program.
Project analysis	• To ensure that the project is easily accessible. • To make sure that the content is relevant and functional. • To provide the needed communication channels.
Media analysis	• To select the best combination of graphics, text, hypertext and movement to enhance the specific site. • To ensure that the media elements applied to the site serve the relevant purpose.

3.2.2 Limitations

The fact that the project dealt with a Department with limited students; the number of **questionnaires** successfully completed, was a limitation. At the time of handing out the questionnaires the majority of students and lecturers were away on a seminar/conference for a period of ten days. That affected the way in which the researcher planned to administer the procedure. Control over the people involved was minimal and there was no assurance that all the questions were fully understood and interpreted correctly.

Concerning the **Focus groups**, the different Departments in the design field e.g. Architecture, Landscape Architecture and Interior Design, resorting under the School of the Built Environment, had a different perspective of the project as a whole.

3.3 Analysis methods

The researcher made use of methodological triangulation. This method implicates the use of more than one analysis instrument, which is indicated in Table 3.3 and described thereafter.

Table 3.3   Data collection methods during the analysis phase.

	Interview	Research Diary	Questionnaire	Focus Group	Literature Review
Goal analysis	✓	✓	✓		
Target analysis		✓	✓		✓
Task analysis				✓	✓
Content analysis			✓		✓
Project analysis	✓				

♦ **Interview**

Interviews were held with the Head of the Program, also lecturer in the Program in Interior Design, in an informal manner. He informed the researcher about the possible target population and supplied more specific details about the student audience to whom the project would provide essential information regarding their studies.

Interviews with students on the **Open day** of the University of Pretoria informed the researcher about the need concerning the content of the project and general background information about the target population.

◆ **Research Diary**

During the analysis phase a research diary was kept to follow the changes which affected the development of the project. The client made changes to the overall 'look and feel' of the web site. The client corresponded with the researcher via e-mail to provide essential information regarding the content of the site. The need for specific tools, which could promote learning and communication, was also specifically mentioned.

◆ **Questionnaires**

The **first** questionnaire was handed out at the **Open day** of the University of Pretoria. This questionnaire consisted of general questions divided into 5 categories with yes/no options and open-ended questions to establish their general background and status of computer literacy.
(See Appendix A)

The **second** questionnaire was more structured. Questions in 5 sections were formulated in multiple choice options to gain specific information regarding the target population. Questions with a value of 1-5 presenting most frequent to least frequent were supplied to obtain richer data concerning their learning needs and communication means.
(See Appendix B)

A **third** questionnaire was aimed at the evaluation of the web site after development. This questionnaire was statistically compiled and divided into different categories (layout, navigation, content, communication and support)
(See Appendix C)

A **fourth** questionnaire was compiled as a compressed version of the third questionnaire for the experts and was send by electronic mail to the individual experts. Ample blank space was made available for comments and suggestions. These comments will be added to the findings in Chapter 4 and it added valuable information about the success and shortcomings of the program.
(See Appendix D)

◆ **Focus Groups**

The researcher attended an official meeting where the different Departments of the School of the Built Environment were present. The prototype was discussed in terms of the general layout and structure.

♦ Literature Review

In-depth literature study was done to motivate the relevant design principles for a workable and functional prototype for this specific purpose. Recent articles published on aspects of an Internet-based information resource as well as relevant URL's were listed as references in the literature survey

3.4   Sampling

♦ Students (undergraduates and postgraduates)

20 Potential students attending the Open day completed the **first** questionnaire. 25 Students in different year groups enrolled in the School of the Built Environment completed the **second** questionnaire. These students also completed the **third** questionnaire after evaluating the web site in class.

Informal interviews developed between the researcher and students mentioned above on the Open day.

♦ Lecturers

Telephonic communication and informal meetings with Head of the Program (client) established the content of the prototype. Lecturers involved in the Program in Interior Design completed the **third** questionnaire after assessment of the site.

♦ Professionals/Individuals

Different interested individuals completed the **second** questionnaire to establish their interest in the design field.

Experts in the Information Technology environment, Design Industry and in the educational environment filled out the **fourth** questionnaire.

A group enrolled for a two-year course in Computer-Based Training, participated in the completion of the **fourth** questionnaire.

3.5   Results

3.5.1   Goal analysis

The results of the goal analysis were gathered by the second questionnaire. The two main questions regarding the goal are:

♦   How can this web site promote effective learning?
♦   In what way will the Internet based information resource (web site) stimulate the communication possibilities between students and fellow students, and between students and lecturers?

The results of issues concerning the above questions from the **first** and **second** questionnaires were calculated and reveal the following situation as shown in Figure 3.1 and Figure 3.2.

Figure 3.1   Profile of the potential students in terms of computer skills [♦]
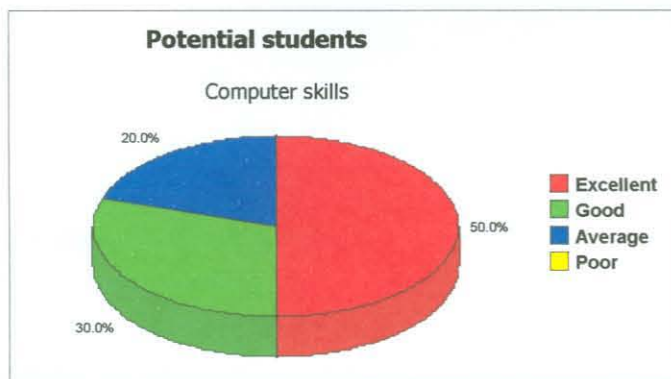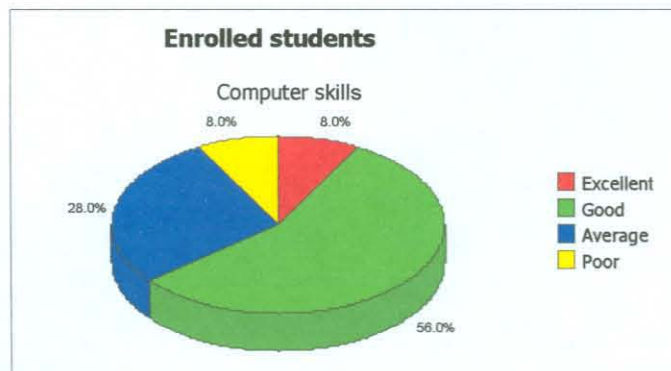

Figure 3.2   Profile of the enrolled students in terms of computer skills [♦]

In order to promote learning through use of the computer and the Internet (web site), the level of computer skills of the target population is an important factor. According to Figure 3.1.and Figure 3.2 it is clear that computer skills of both groups are above average. The outcome reveals that all the students are able to use the computer for general and/ or specific purposes.

Figure 3.3 and Figure 3.4 reveal the accessibility and need of students for a web site as planned.

Figure 3.3   Computer access, Internet connection and need for a web site (Potential students)
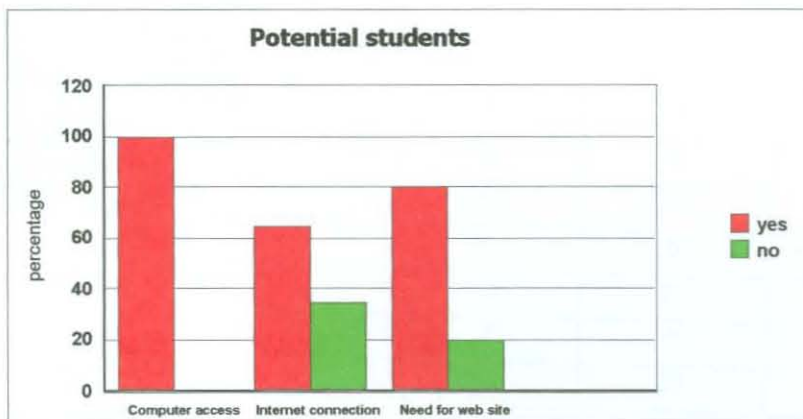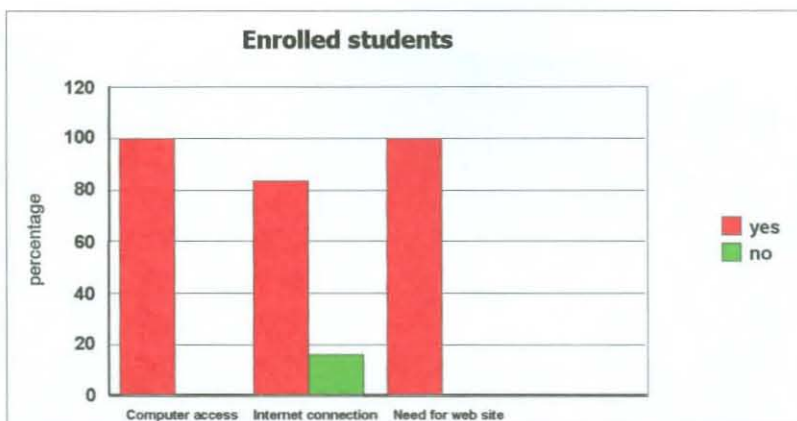

Figure 3.4   Computer access, Internet connection and the need for a web site (Enrolled students)

The goal analysis thus shows that the students (target population) have a need for the planned program and the majority of students are in reach of utilizing such program in terms of their skills and facilities.

3.5.2   Target group analysis

Through convenience sampling, 20 enrolled students and 15 potential students participated in questionnaires to establish the characteristics of the target audience and provide information about their general need and computer skills.

A comparison was made between the two groups with regard to general background information, language abilities and computer literacy. The results of the comparison are set out in Table 3.4.

Table 3.4 **Results of the target population analysis with regard to the general information. [✦]**

	Variables	Potential students (20)	Enrolled students (25)	% ▲
Age	Under 18	15	0	
	Above 18	5	25	
Gender	Male	9	5	25%
	Female	11	20	25%
Language preference	Afrikaans	10	15	10%
	English	7	10	5%
	Sepedi	1	0	5%
	German	2	0	10%
	Other	0	0	
Read and write English	Yes	20	25	0%
	No	0	0	
Demographics	Gauteng	14	18	2%
	North West	3	4	1%
	Namibia	1	0	5%
	Northern province	0	1	4%
	Mpumalanga	0	1	4%
	Free State	2	0	10%
	Other	0	1	4%
Computer skills	Excellent	10	2	42%
	Good	6	14	26%
	Average	4	7	8%
	Poor	0	2	8%
Computer access	Yes	20	25	0%
	No	0	0	
Internet connection	Yes	13	21	19%
	No	7	4	8%
Need for a web site	Yes	18	25	20%
	No	2	0	10%

The profile of the target population displayed in Table 3.4 is interpreted in Figure 3.5 as follows:

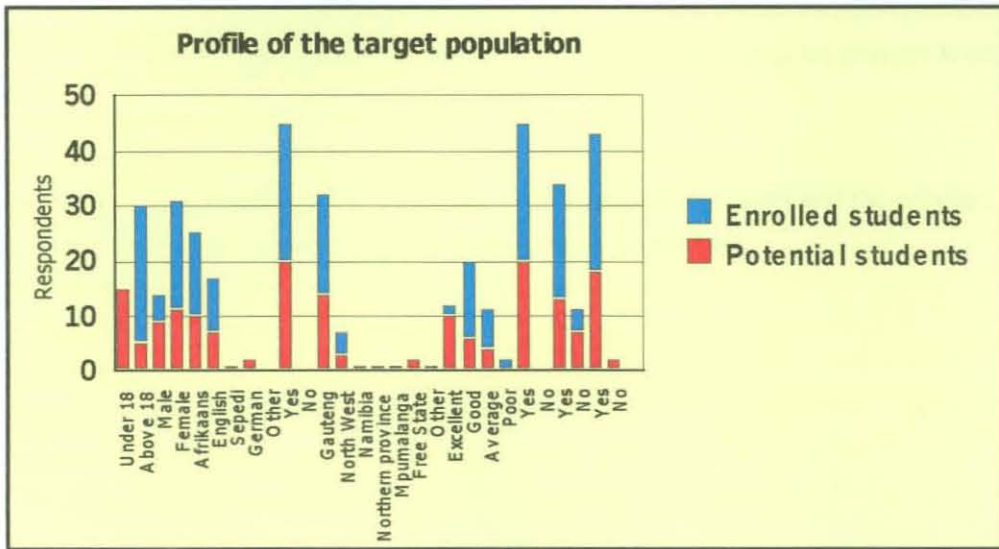**Figure 3.5   A comparison between the enrolled students and the potential students**

Figure 3.5 reveals that the majority is Afrikaans-speaking females. All the students can read and write English (100%).

Of the total number of students, 70% are situated in Gauteng.

Computer skills of the potential students are 80% good and above, whereas the enrolled students rated their skills as 64% good and above. The difference of the results between the two groups could be imputed to the fact that the younger generation are more exposed to the use of computers.

All the students have access to computers and 84% of the enrolled students have Internet connection. Only 65% of the potential students have Internet connection. The researcher assumes that it could be due to the fact that most of them are still living with their parents who are not in desperate need of the Internet

All the respondents revealed an interest in a web site for the Program in Interior Design.

To identify the need for a communication facility for the students and lecturers, the following results were gathered from Questionnaire 1 and 2. These results are set out in Table 3.5.

Table 3.5   **Results from the target analysis regarding communication issues [✦]**

Issues	Response from enrolled students	Response from potential students	% ▲
Internet used for :			
• General information seeking	48%	70%	22%
• Specific information seeking (research)	84%	79%	5%
• Communication	48%	60%	12%
• surfing	52%	58%	6%
Obtain information on a specific subject by:			
• search engine	84%	63%	19%
• time-consuming effort	50%	25%	25%
• trial and error	60%	40%	20%
• specific address	88%	80%	8%
A web site will be beneficial for:			
• advertising	96%	No data	
• communication	88%	No data	
• access to information regarding this site	88%	No data	
• learning and participation internationally	60%	No data	
A communication facility on the web site of the Program in Interior Design will create an effective channel of interaction for all parties involved			
• Yes	100%	80%	20%
• No	0%	20%	20%

The results in Table 3.5 indicate that the target population needs communication facilities for different reasons. The fact however remains that a general communication channel is almost essential.

Figures 3.6 to 3.8 indicate a comparison between the potential students and the enrolled students regarding the difference in need for communication and information.

Figure 3.6   **A comparison between the communication needs of the enrolled students and the potential students.**

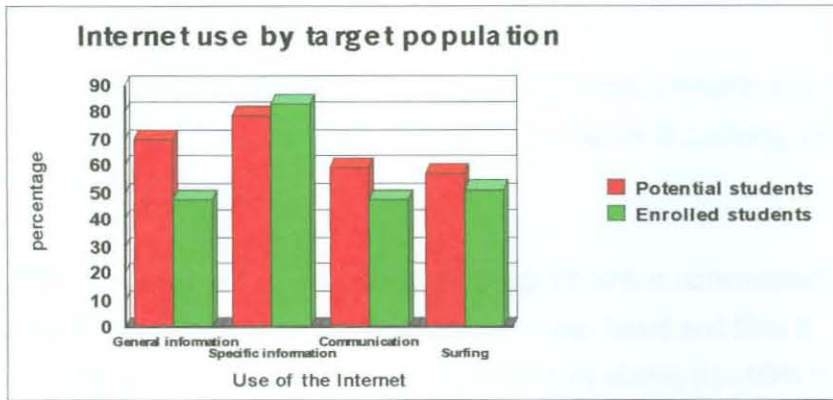**Internet use by target population**

Figure 3.7   **Ways of searching for information on the Internet by the target population**

Information obtain through the Internet
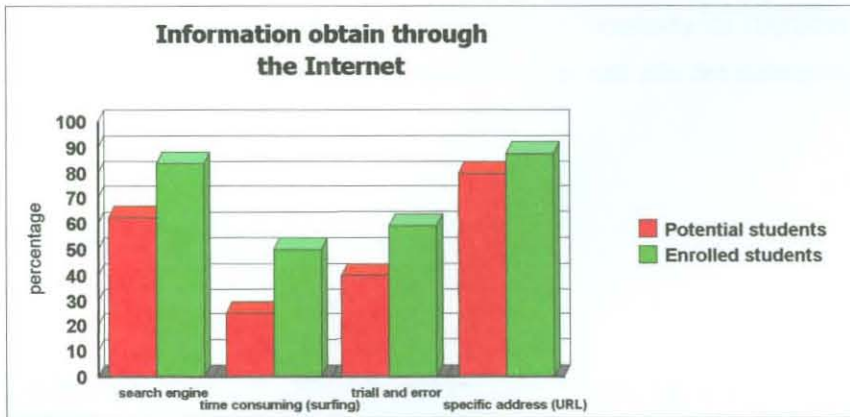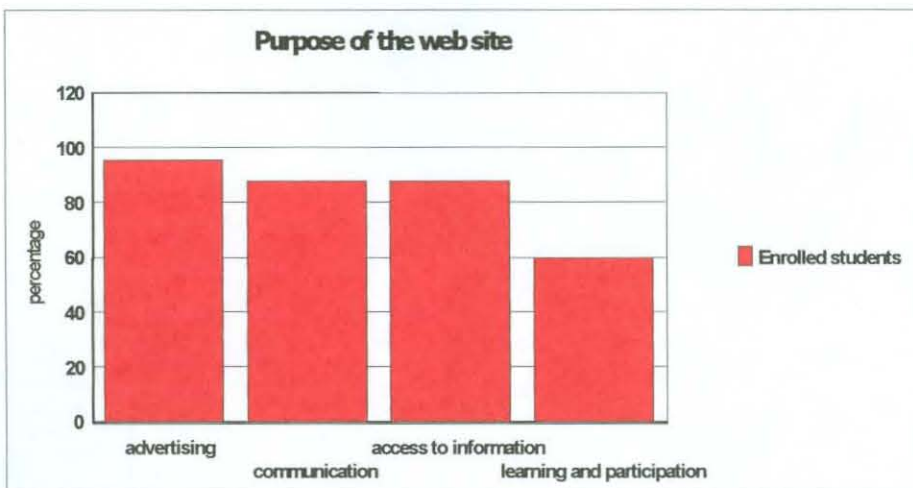
Figure 3.8   **Purpose of the web site**

Purpose of the web site

3.5.3 Content analysis

Bearing in mind that the client provided all content, not much analyzing was done in terms of the information included in the program. The presentation of the information however, was dictated by the design principles relevant to an educational web site. Design principles are discussed in Chapter 2 (Literature Review) but the principles relevant to this specific site will be discussed in the design stage.

Essential content e.g. student work, projects done by the Future Trends Laboratory and other learning material which was initially decided upon, was not included in the prototype at this stage, due to circumstances.

The incorporation of the communication channels (bulletin board, Listserve, e-mail) which form part of the content will be added by the webmaster of the University in order to keep to the prescribed structure and requirements.

Needs and general requests from the students and lecturers concerning the current content were revealed by the **second questionnaire.**

3.5.4 Media analysis

The combination of media elements applied in the program is very important and the success of the web site is greatly dependent upon this matter.

By creating multimedia, a combination of text, graphics, high quality sound, animation and video, delivered by computer or any other electronic means, is presented. (Lappas & Kekkeris, 1996:1; Stratfold & Laurillard, 1993:488; Coetzee, 2000:64).

According to Bass (1997:5) and Coetzee (2000:67) only an average of 10% is remembered 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. Bass concludes by stating that 90% is remembered when a person is involved in a job it self, even if only as a simulation.

Bearing in mind that the main purpose of the web site is that of learning and communication, the chosen media should fulfil the function of promoting these two objectives. Using Gagne's nine events of instruction (cited in Reeves, 1997), and Bloom's Cognitive Taxonomy for cognitive learning outcomes, the following media elements appropriate for the web site are summarized in Table 3.6.

Table 3.6   Media elements applied to promote learning and communication

Media element	Gagne's nine events	Bloom's Taxonomy
Graphics/Animation	Gaining attention	
Text	Informing learner of objective	Comprehension (2)
Hypertext	Stimulating recall of prior learning	Knowledge (1)
Video/Sound	Presenting stimuli with distinctive features	Analysis (4)
Text/Hypertext	Eliciting performance	Application (3)
Text	Providing assessing feedback	Evaluation (6)
Hypertext	Enhancing retention and learning transfer	Synthesis (5)
Sound/Movie	Stimulating change	
Graphics/Text/Animation	Appealing to the learner's interest	

Media is incorporated in the following ways throughout the web site:

♦ **Text**: A great amount of text is used in order to convey information to the new and interested students. Course content will be added relevant to the different levels of study. The text is in black for easy readability and in a popular and effective typeface (Arial). Using a bigger fontface with style difference as headings creates the necessary accent. For the main headings, a different font is used with colours to identify the sections.

♦ **Hypertext**: The text on the navigation bar is linked to the appropriate pages. This is known as internal links and part of hypertext. Named anchors are used to move directly to certain places on a page within the program. This makes it easier for the user to get to specific content more speedily. From the navigation bar which is visible on each page of the web site to specific text on a page is possible with hypertext.

External links will be used on the **"Useful Links"** page to connect users to another site for relevant information. This function helps the user to reach important text (content) from a central starting point.

Contact with other professional and academic institutions are also done with hypertext.

♦ **Graphics:** Keeping in mind that this web site is informational as well as design orientated, graphics are an integral part of the site. Suitable graphics are used to demonstrate student work but also for aesthetic purposes. Most of the graphics were provided with the content, while others were chosen to suit the Interior Design Industry.

Three-dimensional graphics will most probably be incorporated later as more student work will be displayed.

♦ **Animation:** Initially the researcher and developer added a little animation to the home page. Subsequently the home page changed and with a new classical "look" to the home page the animation was not suitable.

It is actually still a possibility to add animation to the **"What's on"** page to attract attention and advertise events and announcements.

Through the **third questionnaire** the media elements applied to the web site are evaluated and the need for other media such as animation, movement and sound will be determined.
(See Appendix C)

Questions from the questionnaire that address the different media elements, are:

Q 1   Appearance of web site and overall "look" - **combination of media**
Q 2   Readability on the pages - **Text**
Q 5   Choice of fonts - **Text**
Q 6   Layout of site map - **Hypertext (Internal links)**
Q 11   The link page will attract more visitors - **Hypertext (External links)**
Q 14   The way in which the content is presented gain the attention of the visitor -
       combination of media
Q 15   The choice of graphics - **Graphics**

Refer to Chapter 2 (Literature Review) for detailed description of all the media elements used in the program.

3.6   Stage 2: Design

The importance of design is "to identify and document the best means of achieving the desired results" (Hannafin & Peck, 1988). According to Allesi and Trollip (1991:293) the design phase is essential to assure the effectiveness of a program. The elimination of ideas concerning the content and methodologies takes place during this phase. All reviewers should be satisfied with the project when the design phase is completed. The design phase is the answer to the needs analysis, where the design objectives should be met and motivated.

The objectives were met by making use of different design strategies. The client suggested the overall look, the sections of content and provided the graphics. Other matters, which were taken into consideration during the design phase, are set out in Table 3.7.

Table 3.7   Matters taken into consideration during the design stage.

The theme (metaphor)	A trendy 'look and feel' to represent a Design Industry and to draw the attention of users.
The content	The general information is given first with more specific detail about course material etc. to follow. It was decided in advance to present the content in a priority of primary and then secondary importance.
The sections (Matters)	The information was divided into logical sections : Background / Educational Matters / Future Trends / Workshops / Links / Contact Details
Icons and navigation	The graphic representing the Program in Interior Design developed into a metaphor, appearing on each page. The home page icon (ID) was taken from the original image.
Communication facilities	The need for specific communication and learning facilities were agreed upon: Bulletin Board, Listserve, E-mail
External links	A "Useful links page" with links to a variety of design related industries is incorporated hoping to promote the return of visitors.

The design objectives and the way in which they will be met, can be summarized as follows in Table 3.8:

Table 3.8   Design objectives

Objectives	How will objectives be met?
Promote **effective learning** in general and specific	• Relevant information for students. • Content well indicated and outlined in the site map. • Use of fashionable colours to attract the attention of the students. • Present the content in manageable chunks.
Develop comfortable and **efficient communication** channels for students and lecturers.	• Introduce e-mail for convenient individual communication. • The incorporation of a bulletin board for general announcements and appointments. • The availability of a Listserve for problem-solving and interclass discussions.

3.7   Designing for a specific delivery system

According to Bates (1995:2) and Le Page (1999:31), the choice of a suitable vessel is essential for the success of an undertaking. That is why it is important to ensure that the majority of your target population including "users" with old browsers should be able to enter a web site.

Students involved in the Program in Interior Design at the University of Pretoria will be the primary users of this web site. From information gathered through the analysis of the target population, it was clear that the majority of the potential students and the enrolled students have access to the WWW through the Internet. The communication channels incorporated in the site are also dependent on Internet connection. Therefore the decision was made to use the WWW as the delivery system.

Because the web site provides general information e.g. the requirements for enrollment, course layout, and background of the Program and administrative matters, the client in conjunction with the researchers decided to provide the site on CD. This would inform potential students and their parents about the Program in Interior Design. Another reason for providing it on a compact disc (CD) is to inform related industries about the courses and projects presented by the Program in Interior Design.

Barriers restricting the use of the Internet and the World Wide Web are a concern when planning the development of a web site. In the environment in which this site is planned, technical restrictions, which should be taken into consideration, are:

♦ Old hardware, including modems and incapable CPU's that can not support modern graphical browsers needed for successful surfing. (Maddux, 1998:24)
♦ Limited bandwidth and large file sizes, which affect the downloadtime. (Remmers, 1998:17)

With the target population being involved in interior design and related industries the researcher assumes that they should be in possession of the required hardware and appropriate bandwidth.

3.8   Sequencing of content

> "Proper sequencing of instructional objectives and teaching points is essential as it can have a significant impact on the efficiency and effectiveness of the learning situation."
> (Van Dyk et al cited by Hodgkinson & Cronje, 1999:29)

It is essential that the content be mapped out in order to create a logical flow to the structure as a whole. For this purpose it is wise to create a navigation map (site map) and preferably display it up front as a second screen. The user who visits the site for the first time will be able to relate to links and connections made between the different sections.

According to Hodgkinson & Cronje (1999: 29), different approaches can be followed to sequence a learning experience. The content can either be in order from general to specific or vice versa. It can also be sequenced from concrete to abstract or from known to unknown.

During the design of the program these guidelines were followed and the content is sequenced accordingly. Table 3.9 indicates the sequencing of content in the program:

Table 3.9   Sequencing of the content

Topic/Sub-topic	Sequencing
Site map	Colour identification All the main topics with sub topics
Background	General to specific
Education	General to specific Information for all students Information for the different study levels Study material and content
Workshops	General to specific Student work Contributions from individuals
Future Trends Laboratory	Known - unknown
Professional links	Only Specific information and links to academic and Design institutions
Useful links	General information and links
Contact Details	Specific information to all interested users

3.9   Design Specifications

Specifications concerning the design of a multimedia program were discussed in the literature review (Chapter 2). According to Adendorff (2000), computer-assisted learning delivers no better results than traditional methods, only because the program 'was poorly designed'. This is enough reason to realize the importance of a thorough design process.

Appropriate design elements were implemented in this program and is set out in Table 3.10 (text) and Table 3.11 (graphics, white space, colour)

Table 3.10   Design specifications regarding text as implemented in the program for effective learning and communication.

Design specifications	Implementation in program
Text attributes	
Type face	Comic Sans is used for the main headings and the navigation. Content is written in Arial. Both typefaces are Sans Serif and the readability is good.
Size	Heading 1 is written in a 16 pt, the sub-headings are written in 14 pts. and the body text is written in 12 pts. These sizes accommodate the readers as well as the printing. Table content is in a 8 pt.format. The reason for this is so that the tables appear more compact and streamlined.
Colour	Black text. It is best readable and complements the background colour of the pages.
Type styles	The main headings are **bold** to indicate importance. Other important keywords in the body are also in bold to emphasize the words. Underline is only used to identify links.
Justification	Body text is left justified. Recommended in the literature.
Case	A combination of upper and lower case. Best suitable for easy reading.
Icons/ Symbols	An arrow is used to indicate that a next page of the same subject follows. A variety of symbols and logos on the **'Useful Link'** page refer to external URL's. All these icons and symbols are eye-catching and the colours create an exciting look.
Buttons	The logo (image) of the Program represents the home button. This image button relates to the rest of the theme set by the Program. Text buttons are used on the navigation bar for easy and clear access to the different subjects. Text buttons are also used for the sub-navigation appearing just below the main headings on each page.
Animating text	This is still not incorporated but will be in the form of a banner on the **'What's on'** page to attract the attention of the user and advertise the current events. For this purpose it will have to be changed and updated regularly.
Layout of text	Scrolling of text was kept to a minimum. According to the literature, the ideal is not more than 2 screens at a time. Scrolling to left and right was avoided. Blank lines divided text into paragraphs and an image called "leaf scroll" also divided the text into separate thoughts. It appeared at the end of each page to indicate the closure. The central 10cm were used for text with enough white space on either side to display the text clearly.

Table 3.11   Design specifications regarding graphics, white space and colour

Design specifications	Implementation in program
Graphics and Images	Graphics used in the different sections were provided by the client and represents work by students and other design related parties. Therefor the graphics fit in with the general theme and look of an Interior environment. The Development team created the image appearing on the Home page. It was the original logo image, faded out to blend into a background taken from the dominant colour in the image. This created an uncluttered, flimsy feel to the site. Most of the graphics and images have alternative text to accommodate a text-only browser.
White space	There is not too much information on a page and effective communication can take place. The white space on the left and right side as well as in between text illustrates the relationships and separate ideas. Chunking is created through the application of white space. The well-planned white space enhances balance in the site.
Colour	All colours used in the web site are web safe, meaning that it should not change on other browsers used to view the WWW. All colours were derived from the image representing the Program in Interior Design. From the above, the background colour of all pages was set on a sand colour. The client provided a palette of desired colours in earthy shades and that was adapted to the nearest web safe equivalent to represent the different sections/ subjects. The user could identify the different subjects/sections with a colour throughout the site. Text is all in black to complement the background colour and is easy readable. The navigation is on a dark green background and the same on all pages to avoid confusion. It is clearly visible.

3.10   Screen design principles

Table 3.12 indicates the different screen design principles and the way in which they are applied to the program.

Table 3.12   Screen design principles applied to the program

Screen design principles	Implementation in Program
Consistency	Main headings were always the same size and placed in the same spot. Caps are always used in the same way. Navigation throughout the same. The top structure on all pages is the same with exception of colour.
Simplicity	Only 2 typefaces are used (Arial and Comic sans). The layout is in a single column format. The content is understandable for the target population.
Clarity	The use of colour in the web site identifies the different sections. The navigation is clear and easy to follow. Bulleted lists where applicable.
Aesthetic considerations:	
Balance	An asymmetrical balance creates an informal feel by the uneven top structure. Elements of differing shapes and sizes are added to ensure a stable unity.
Harmony	Graphics, colour and text are applied in a consistent manner and harmony prevails throughout the site.

Figure 3.9 and Figure 3.10 are examples of screen design principles applied to this program:

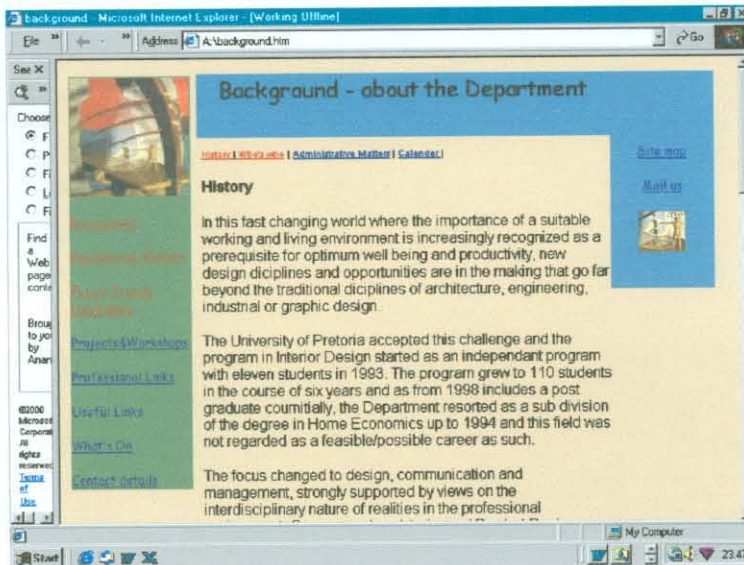**Figure 3.9   An example of consistency [⊕]**

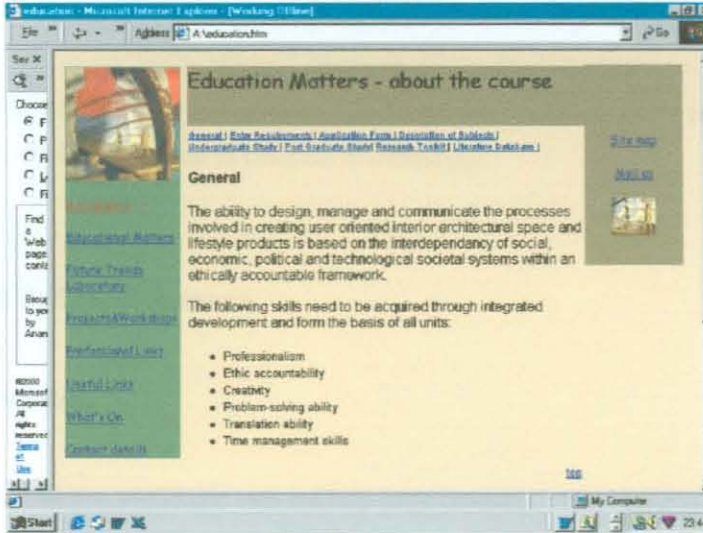**Figure 3.10   An example of simplicity [♦]**

Table 3.13 and Table 3.14 were compiled to indicate where the design principles derived from and the application of the specifications in the web site. The first table describes it from the client's point of view and the second table indicates the composition of the site with regards to the relevant design specifications.

Table 3.13   Derivation of design specifications

		Exposure	Accessibility	Hypertext	Mod/classic look	Sections	Communication	Mail facility	Movement	Colors	Layout of text	What's on	Graphics	Corporate logo	Delivery system	Site map	Design implications
Target group characteristics	Age 17-24				✓				✓	✓							Funky colours/ animation
	Artistic flair				✓												Symmetric/ Asymmetric
	Logical					✓										✓	Clear structure/
	Computer access		✓														Use web
	Need information	✓					✓					✓					Easy contact/ Eye catching
	Research			✓													Exposed to content
	Internet knowledge														✓		WWW
	3-Dimentional								✓				✓				Visual animated
	Creative				✓						✓						Text centered
	Assessment						✓	✓									Contact / student-lecturer
	Inquisitive		✓														Use URL's for info
	Academic content				✓							✓		✓			Metaphor/Clear/ Understandable
	Geographical						✓	✓									Promote learning

Table 3.14   Derivation of the design specifications regarding composition of the site

Design implications	Home page	Menu bars	Page layout	Sections	Font	Symbols	Navigation	Link page	URL's	Headings	Projects	Specifications
Understandable/ Clear			✓	✓								Clarity
Corporate logo	✓											Buttons/ Icons
Eye catching						✓		✓				Animating text
Trendy colour		✓								✓		Balance
Symmetric/ Asymmetric			✓									Consistency
Chunking				✓								Simplicity
WWW/Links								✓	✓			type face
Content					✓	✓						White space/ Simplicity
Visual impact											✓	Animation

3.11   Evaluation instruments

The evaluation instruments were designed to establish the target population for the program in the first instance, and secondly to determine the success of the design and workability of the program through a questionnaire. This questionnaire was designed to produce rich data regarding a variety of relationships and variables within the target group. More detail about the evaluation instruments and procedures can be found in Chapter 4, while the results of these questionnaires will be discussed in Chapter 5 (Findings).

3.12   Stage 3: Development

3.12.1 Introduction

The development of the prototype was initially experimental. The client provided a variety of elements, which the researcher experimented with, to end up with a "look and feel" to suit the different parties. No hard and fast rules were laid down at this stage.

3.12.2 Authoring Tool

The developers had no knowledge of HTML and therefore decided on an authoring tool, *Front Page*, produced by *Microsoft*. While the developers are familiar with other *Microsoft* programs, it appeared to be the most appropriate choice.

A change of plans occurred after the first stage and instead of *Front Page*, the developers decided to experiment with *Dreamweaver,* which is a Macromedia program. This decision was brought about by fellow students, purely for the fact that one can place images or text in layers, which can be moved around at any time and to any spot on the page.

According to an article published in a computer magazine,"Macromedia designed it so you can extend it yourself." (Hodge, 2000)

Dreamweaver pre-empted the confusion between *Netscape* and *Windows Explorer* of what DHTML is. This was the first mainstream drag-and-drop-authoring tool to include support for DHTML through JavaScript. *Dreamweaver* allows you to build interactivity into pages that will run happily on either browser without learning a single line of code. (Hodge, 2000)

This authoring tool is a professional visual design solution for creating Web sites. The use of this tool enhances team efficiency and promotes users to automate production. It is possible to integrate *Dreamweaver* with other Web applications such as *Microsoft Office.* *Dreamweaver* can be customized using HTML, JavaScript and XML for advanced Web site building.

A very important feature of *Dreamweaver* is the fact that it can design and manage cross-browser Web sites without sacrificing the HTML control. (Dreamweaver information,1999)

FrontPage works well on *Netscape Navigator* as well as *Internet Explorer*. The tool can create a form, which can send data to a text file. It can also place graphics and text anywhere on the page - even layer content. *FrontPage* is great for wrapping text around an image. It chooses web safe colours for graphics and text. (FrontPage information, 2000).

A more detailed motivation is set out in Table 3.15 comparing *Dreamweaver* with *Front Page.*

Table 3.15   Comparison between *Front Page* and *Dreamweaver*

(PCFormat, *Tried and Tested*)

Dreamweaver-92%	Front Page-72%
Work with tables and layers.	Work in tables.
The layers can be moved around.	Tables are fixed.
Interface superb.	Similar to the rest of Office package.
WYSIWYG authoring tool - drop and drag.	Menu and buttons not logical.
Support for HTML frames - easy splitting windows in two.	Customized theme for instant look and feel.
Library to store frequently used objects.	None.
JavaScript functions - e.g. for mouseovers go to **Behaviors.**	Neglected the use of JavaScript.
Strip unnecessary code from Web pages.	None.
Preserve code - Roundtrip HTML.	Roundtrip idea from Macromedia.
A web design killer application.	It has improved from previous versions.
Excellent site management.	Site management on par.

3.12.3   Planning/ Storyboarding

Planning was done on paper before the development started on the computer. Hannafin & Peck (1988:61), describes this as the "illustrations depicting each change to the computer screen and conveying other important information to the reviewers and programmers"

The design and development of the program was done by the researcher and a second party who is involved in the research of the marketing aspect of the same program. The storyboarding was therefore done together and functioned as a structure and guide for the two developers working on the same web site.

### 3.13   Prototype and evaluation

3.13.1   Phase 1

The initial home page was designed from a section taken from an image representing the **Department of Interior and Product Design**. This section was enlarged to a background image and as a result of the enlargement, a tiling effect was caused.

An embossed texture was added to the background. The colour of the text was blue, corresponding with the blue in the background. The developers decided upon a font, which would suit the Design world (*Lucida Handwriting*).

The developers added a text animation to welcome the user to the site. The animation appeared only for a few seconds and then remained stationary. The home page of the first phase was captured and is displayed in Figure 3.11

Figure 3.11   Home page of phase 1 [✦]
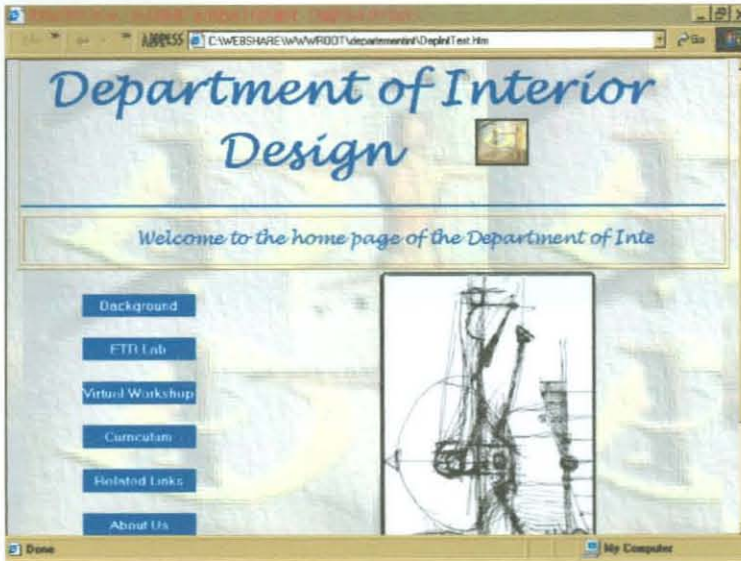
3.13.2   Evaluation of phase 1

There was no formal evaluation in the first phase. The developers showed the home page to a selection of people and different comments and suggestions were received.

The look of the page appealed to most of the people. The tiling effect however, was disturbing. Pages to follow had a different texture, which affected the consistency.

The different headings were not placed exactly on the same level and it caused the eye to jump when screens changed.

3.13.3   Phase 2

At this stage the client informed the developers that the name of the site had to be changed due to the restructuring. It was now called **Program in Interior and Product Design.** Except for the change of the name, there was still no prescribed look for the home page and something totally different was presented in order to provide alternative options.

The developers and the client agreed on a trendy, modern appearance. The original image from the first phase was used, but as a button to indicate the home page.

The developers produced a possible prototype with bright colours. This was a second starting point. Lime green and bright orange reflected a trendy design feel. An abstract design was placed in the centre of the screen and lead to a square and structured layout, with the navigation square on the left hand side of the screen. Other navigation was aligned at the bottom of the graphic design. The font being **Comic Sans** complimented the informal and 'fun' look. The text was in black.

The first specification, which had to be incorporated, was the logo of the University of Pretoria and that was placed at the bottom right hand corner.

The following pages displayed a structured look, as the navigation and main heading almost formed a frame at the top of each screen. Each section was identified by a specific colour captured from the center design on the home page.

Figure 3.12 displays the bright and trendy appearance of the home page in phase 2 and Figure 3.13 reveals the structured layout of the other screens.

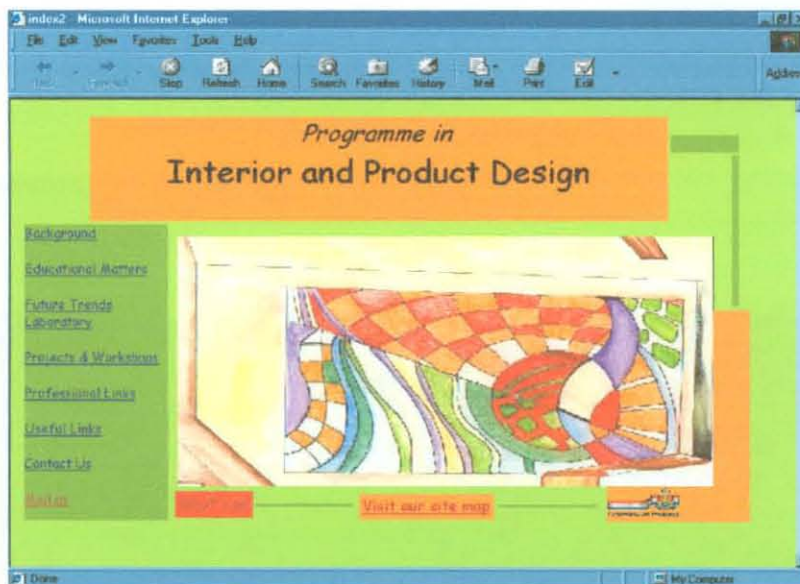## Figure 3.12   Home page of phase 2 [✦]

Figure 3.13   An example of a web page in phase 2 [✦]

Icons used in phase 2 create the feel of unity and a corporate theme consisting of the colour combinations and these icons meet the principles of design as well as the prerequisite of the university. Figure 3.14 displays an icon.

Figure 3.14   An icon used in phase 2 [✦]

3.13.4   Evaluation of phase 2

The developers had a meeting with the client and discussed the proposed prototype.

   ◆   The client preferred the shade of the chosen colours more subdued.

   ◆   A brochure with the desired colours was provided.

   ◆   The client approved of the general layout of the pages to follow the home page and the present colours had to be changed to resemble the provided brochure.

   ◆   The client however agreed to design a home page, which would represent the **Program in Interior and Product Design** and would please the majority of the Department.

   ◆   People in general found the home page attractive and the colours exciting and funky.

3.13.5 Phase 3

During this phase the client provided the designed home page. Again this was a total change. Primary colours were used and a theme of Africa and ethnical influence were supposed to represent the Design Industry for the new Millenium.

The developers added animated text to the home page in order to advertise current and forthcoming events. Figure 3.15 displays the home page of the third phase.

Figure 3.15   Home page of the third phase [♦]
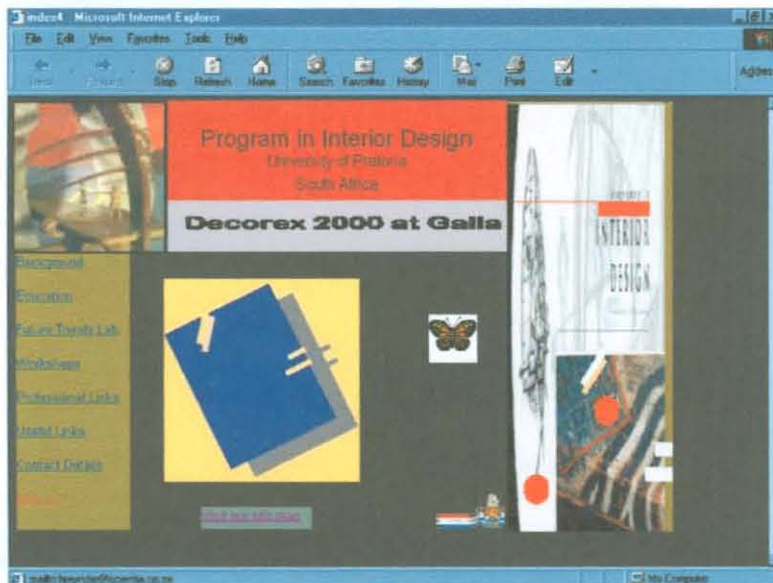
3.13.6 Evaluation of phase 3

The download time of this home page was very slow because of the amount of images taken from a Word document/ PowerPoint presentation.

♦ A focus group comprising of representatives of the School of Built Environment decided that a uniform theme would be more appropriate bearing in mind that the above Departments resorts under the same School.

♦ This proposal was completely unacceptable. The representatives suggested that they should sit together and design a suitable homepage to accommodate all the involved disciplines (Interior Design, Architecture, and Landscape Architecture).

3.13.7 Phase 4

Because of limited time the client and developers decided upon a neutral home page. At this stage the client was absent for a substantial period of time. The proposed design of a new home page by the representatives of the School for the Built Environment did not realize.

The developers used the representing image for the final home page. The edges were softened to blend into the background and the pages to follow were adapted to blend in with the background of the home page. Figure 3.16 displays the home page of phase 4 and Figure 3.17 is an example of a content page of the web site.

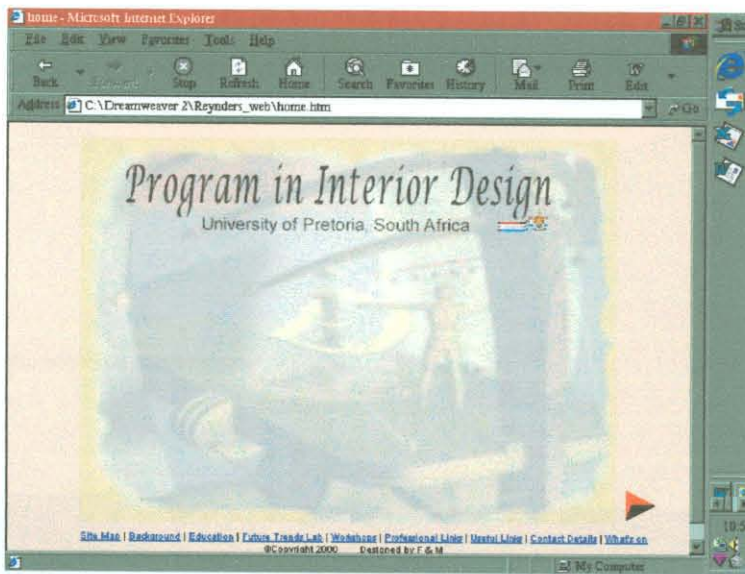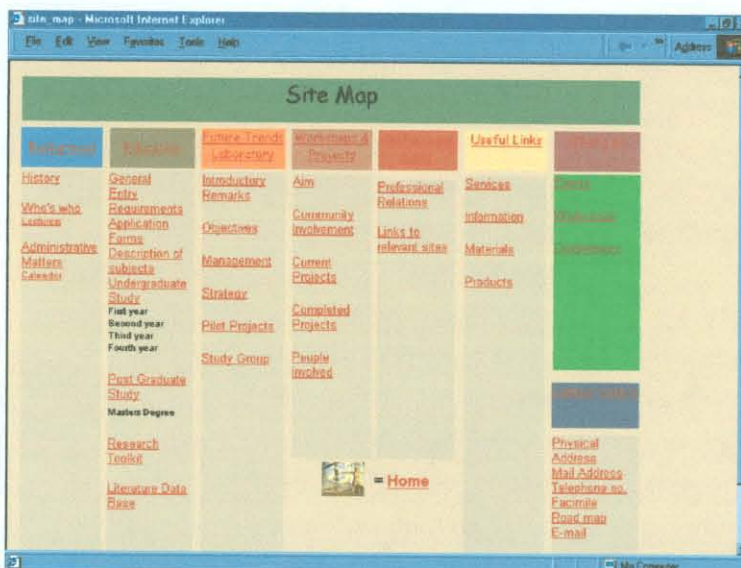**Figure 3.16   Home page of the fourth phase [♦]**

Figure 3.17   An example of a page in phase 4 [♦]

3.14   Stage 4: Production

3.14.1   Introduction

According to Lynch and Horton (1997), "the safe area" dimensions for layouts should be designed to print a maximum of 535-pixel width and 295-pixel height. The average screen size is between 14 and 15 inches and is set to display a 640 x 480-pixel screen. In the design of this site, which is mainly informational, it was of utmost importance that the content would fit into the available space. This would ensure easy printing and avoid the loss of any information. Vaughan (1998:497) recommends that the design should fit into the working space on the monitor, being 600 x 300 pixels. Bearing in mind that the controls and slider bars of the browsers take up the additional space. He suggests that the developer include eye catchers, which would be viewed by the user without having to scroll in the above-mentioned space.

The fact that the general information will be available on CD-ROM is very appropriate, keeping in mind that it can hold large amounts of data (up to 660 MB), be reproduced relatively quickly and inexpensively. It is also a standardized format and can be utilized by most available CD players.