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List of acronyms

ACRL	Association of College and Research Libraries
CAUL	Council of Australian University Librarians
CD	Compact Disc
CD-ROM	Compact Disc Read-Only Memory
DILP	Digital Information Literacy Program
DVD	Digital Videodisc
GIF	Graphic Interchange Format
IIS	Internet Information Server
ILP	Information Literacy Programme
JPEG	Joint Photographic Experts Group
MB	Megabyte
MHz	Megahertz
NQF	National Qualifications Framework
OPAC	Online Public Access Catalogue
RGB	Red, Green, Blue
SCONUL	Society of College, National and University Libraries
TILT	Texas Information Literacy Tutorial
TUT	Tshwane University of Technology
URL	Uniform Resource Locator
WebCT	Web Course Tools

Definition of terms

Academic library

A library that is part of an academic institution such as a college or university. An academic library supports the curriculum and research needs of its students, faculty, and staff (Online Library Learning Center …, 2005).

Digital information literacy

A set of digital abilities requiring individuals to recognise when digital information is needed and have the ability to locate, evaluate, organise and effectively use the needed digital information in an ethical and legal way.

Digital information literacy program

A set of instructions, via a computer, that will aid a student in identifying digital information which will address a particular information need, locate the digital information, evaluate, effectively organise and ethically use the digital information in a digital format.

Generation Y

A name used for a “generation” comprising those born in the 1980s to present; it is the largest demographic grouping since the baby boom of the late 1940s to early 1960s (TheFreeDictionary, 2004b).

Higher education

A level of educational provision defined by the National Qualifications Framework (NQF) in South Africa … higher education includes education at the post-school, pre-degree level, in certificates, diplomas and higher diplomas ... all undergraduate and post graduate [sic] degree programmes, bachelor degrees to the doctoral level (Human Sciences Research Council, 2004).

Information literacy

A set of abilities, requiring individuals to recognise when information is needed and have the ability to locate, evaluate, and use effectively the needed information (ACRL, 2000).

Information literacy programme

A course of academic study that will aid a student in identifying information which will address a particular information need, locate the information, evaluate, effectively organise and ethically use the information.

Student

A term referring to those people pursuing a diploma or a degree course at an institution of higher learning e.g. a college or university (Mothata, 2000:166).

Web based

Any software that runs on or interacts with a Web site, which may be on the Internet or on an in-house intranet (Freedman, 1999:990).

Chapter 1

Introduction

This dissertation reports on the design and development of a digital information literacy program (DILP) for an academic library.

1.1 Background

According to the Association of College and Research Libraries (ACRL) (2000:4) and Thompson (2002), the task of higher education institutions is to develop lifelong learners through the implementation of high educational standards. These sources call for information literacy to become a central core set of skills required for an undergraduate degree.

This is also the case in South Africa, where pilot projects were undertaken by academics in higher education institutions (Underwood, 2002:6). Examples of these are

- the integrated academic literacy programme at the Cape Peninsula University of Technology .
- an undergraduate information literacy course at the University of Stellenbosch (Underwood, 2002:7).

In support of the above programmes, the Group on Life Skills Curriculum (Technikon Pretoria, 2002:1) motivated that information literacy programmes (ILPs) should not only support the academic development of a learner, but also address life skills requirements.

The exit level outcome for ILPs should enable the learner to access and utilise information effectively through the application of technology (Technikon Pretoria, 2002:9). Specific learning outcomes that ILPs should comply with, are for the learner to

- recognise the need for information required for a task.
- identify and search a range of appropriate sources to locate and retrieve the information required.
- evaluate the information retrieved.
- incorporate the selected information into his/her knowledge base.
- use the information effectively to accomplish a specific purpose.
- understand and respect the ethical and legal aspects of information and its technologies (Society of College, National and University Libraries (SCONUL), 2004:4, 16-20, 25-26 & ACRL, 2000).

When compared to the following definition of information literacy, it is clear that the learning outcomes listed above promote information literacy.

> A set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information (ACRL, 2000).

The question arises, ‘’Who will be the service provider of these ILPs?’’. According to a proposal by the Working Group on Life Skills Curriculum of the former Technikon Pretoria (2002:3), the service provider of information literacy should be the library.

It is a worldwide trend, according to Kasowitz-Scheer & Pasqualoni (2002), that academic libraries provide information literacy instruction. Thompson (2002) agrees by stating that: ‘’during the later decades of the twentieth century, an information explosion, fueled [sic] in part by a revolution in information

technology has deeply affected academic libraries and higher education … these changes makes [sic] the time ripe for … teaching information literacy''.

However, the teaching of traditional information literacy is not enough, because the Web and other digital information resources have brought about more methods and sources to satisfy people's information needs (Correia & Teixeira, 2003:312). This implies that a new set of skills, which allows a student to locate, evaluate and use digital information resources, is required (Illinois Mathematics and Science Academy, 2003).

The needs and requirements of students should be taken into consideration when providing digital information literacy programs (DILPs). Fowler and Dupuis (2000) explain that students display a wide range of skills, where some have computer experience and others have little or no computer experience. This is also the case at the academic libraries of higher education institutions in South Africa, where students are drawn from a variety of cultural, economic, educational and social backgrounds.

The above-mentioned factors may influence the design and development of DILPs – since the students are the users of these programs. The DILP should therefore be designed with the South African student in mind and be offered by the academic libraries of higher education institutions.

1.2 Statement of the problem

The statement of the problem will be discussed by focusing on the significance of the problem and the problem formulation.

1.2.1 Significance of the problem

Underwood (2002:5) states that a pilot project in information literacy – the INFOLIT Project – was established in 1995. Since then, there have been efforts to establish ILPs at higher education institutions in South Africa. This is also, for example, the case at Tshwane University of Technology (TUT) (Stoffberg, 2004).

However, these programmes were compiled by the libraries to the best of their abilities and not necessarily according to international criteria for ILPs .

It also has to be kept in mind that a major part of the academic libraries' sources is in digital and not necessarily in printed format. For example, 44 of the journal titles at the Nelspruit Campus of TUT are in paper format, while the students have access to more than 150 digital journal titles (Boucher, 2004). Electronic resources portals at academic libraries provide access to thousands of databases, e-books, e-journals, e-dictionaries, *etcetera*. Consequently, academic libraries have to offer DILPs and not necessarily ILPs, to the students.

The assignments given to students at higher education institutions also play an important role in establishing DILPs at these institutions – as it is expected from the students to complete assignments by finding information from various digital information sources, such as the Web, full-text journals, *etcetera.* Students must also create a digital information product – a PowerPoint presentation and/or a Microsoft Word document – with the digital information that they have located. This can all be intercepted by a DILP and enhance digital information literacy skills.

After an extensive search on national (NEXUS, SACat, SANB, *etcetera*) and international (UMI ProQuest Digital Dissertations, Emerald, EBSCO, ScienceDirect, NDLTD and Book Data) databases, in January 2004 and September 2005, it became evident that limited research has been done on

digital information literacy, digital information literacy skills and DILPs. Subsequently, no criteria for these programs could be found. Bawden (2001:220) points out that the term ‘’digital literacy/digital information literacy’’ occurred only 12 times in the literature since 1997.

It was therefore important to determine the criteria for such a program and to develop and design a DILP that complies not only with the criteria for digital information literacy, but also with the profile of the student.

Since this research established the criteria for a DILP as well as the profile of the students, academic libraries at higher education institutions can apply these criteria to their ILPs, and use and adapt the developed program to promote digital information literacy.

1.2.2 Problem formulation

The profile of the South African student at higher education institutions and the criteria for a DILP were determined. Based on the findings, a DILP was designed with specific learning objectives, exercises and content. The development of the program consisted of the identification of the appropriate software and the creation of learning materials to facilitate digital information literacy skills.

1.3 Scope and objectives

In this section, the aim of the research, research objectives, scope, limitations, exclusions and significance of the research are discussed.

1.3.1 Aim of the research

The aim of this study was to design and develop a DILP for academic libraries. The study explored the profile of the South African student as well as the criteria

for a DILP and, subsequently, integrated these during the design and development of the DILP.

1.3.2 Research objectives

The objectives were to

- determine a generic profile of the South African student at higher education institutions.
- determine the criteria for an ILP.
- determine the criteria that a DILP should comply with (based on the criteria for a ILP).
- design a DILP by documenting the elements and principles of design, navigation features, site architecture, *etcetera.*
- develop a DILP by documenting the specific learning objectives and content as well as establishing the relevant software and creating the actual program.

1.3.3 Scope, limitations and exclusions

The research focused only on digital information literacy. The following literacies were excluded: computer literacy, IT/information technology/electronic literacy, library literacy, media literacy, network literacy, Internet literacy and hyper-literacy (Bawden, 2001:219).

Academic libraries at higher education institutions provide access to thousands of digital information sources – ranging from general to more specific resources in the various disciplines. An academic library can, for example, offer access to a general encyclopaedia such as Encyclopaedia Britannica – and/or to a discipline specific encyclopaedia such as Encyclopedia of Finance.

Consequently, the content of the DILP is generic in nature to accommodate students from different disciplines (De Jager & Nassimbeni, 2002b).

1.3.4 Significance of the research

The research established criteria for a DILP, which did not exist prior to the study. The DILP was also designed and developed, keeping the unique profile of the South African student in mind. The DILP will provide academic libraries at higher education institutions with a product that they can use as is, or customise according to their specific needs or circumstances, in order to facilitate the digital information literacy skills development of their students.

1.4 Key theoretical concepts

The key theoretical concepts are identified and defined in this section.

1.4.1 Information literacy

For the purpose of this study, the definition of the ACRL (2000) was used.

> A set of abilities requiring individuals to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information.

The definition was expanded as follows:

The information literate student will also be able to

- determine the extent of information needed.
- effectively and efficiently access the needed information.
- critically evaluate the information and its sources.
- incorporate information into the existing knowledge base.
- use the acquired information to accomplish a purpose.

- understand that the use of information has economic, legal and social implications.
- access and use information ethically and legally.
- apply information technology skills (ACRL, 2000).

1.4.2 Information literacy programme

As no definition could be located in any electronic or printed dictionaries, the following definition was used for an information literacy programme:

> A course of academic study that will aid a student in identifying information which will address a particular information need, locate the information, evaluate, effectively organise and ethically use the information.

1.4.3 Digital information literacy

Since there is little published on digital information literacy, the following definition was used as a basis to determine a comprehensive definition for digital information literacy.

> The ability to understand and use information in multiple formats from a wide range of sources when presented *via* a computer (Gilster, 1997:33).

The digital information literate student will then be able to

- understand a problem and develop a set of questions that will solve the information need.
- solve the problem by using search methods which allow the student access to digital information sources on the Web.
- evaluate the sources by making informed judgements about what is found online.

- consolidate the identified resources into a broader package of information, gathered form a variety of media sources, for example the Web.
- develop critical-thinking skills and use Web tools such as search engines, listing of favourite sites, mailing lists, *etcetera* (Gilster, 1997:33-34).

Digital information literacy will therefore be defined as follows:

A set of digital abilities requiring individuals to recognise when digital information is needed and have the ability to locate, evaluate, organise and effectively use the needed digital information in an ethical and legal way.

1.4.4 Digital information literacy program

Due to the lack of an existing definition, and based on the definition of digital information literacy, the following definition is proposed:

A set of instructions*, via* a computer, that will aid the student in identifying digital information which will address a particular information need in locating, evaluating, effectively organising and ethically using the digital information format.

The definition was adapted from the following definitions and sources:

> To be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate and use effectively the needed information (Wikinfo, 2004).
>
> A program is a series of instructions to be executed in order (Wikinfo, 2003).

According to TechEncyclopedia (2004), ‘’digital’’ is synonymous with ‘’computer’’.

1.4.5 Web based

The following definition from Freedman (1999:990) was used:

> ''Any software that runs on or interacts with a Web site, which may be on the Internet or on an in-house intranet''

1.4.6 Student

The following definition was used:

> A term referring to those people pursuing a diploma or a degree course at an institution of higher learning e.g. a college or university (Mothata, 2000:166).

Although the term learner is frequently used in association with ILPs, it was decided to use the term **student**, as Mothata (2000:94) points out that the term **learner** refers to persons studying in ordinary public schools.

1.4.7 Higher education

The term higher education refers to:

> A level of educational provision defined by the National Qualifications Framework (NQF) in South Africa … higher education includes education at the post-school, pre-degree level, in certificates, diplomas and higher diplomas … all undergraduate and post graduate [sic] degree programmes, bachelor degrees to the doctoral level (Human Sciences Research Council, 2004).

1.5 Research design and methodology

A qualitative research approach was used where the research is concerned with the qualities and the characteristics of a phenomenon for better understanding and explanation (Henning, Van Rensburg & Smit, 2004:5).

A critical analysis of reported research and literature forms the foundation of the study. Higson-Smith, Parle, Lange & Tothill (2000:37) explain that it is the systematic and detailed analysis of existing texts by which the available primary and secondary sources are analysed. The sources were analysed to establish the following:

- A profile of the South African student at higher education institutions
- Criteria for ILPs (both nationally and internationally).

Due to the fact that there is little literature available on DILPs, the criteria for ILPs have been adopted and applied to establish criteria for the DILP.

The design and development of the DILP were based on the guidelines as set out by Dupuis (2003:165-169). Laguardia (2003:x) points out that these guidelines are the blueprint for Web based instruction in libraries. They are for instance:

- Articulating goals and objectives
- Selecting general site architecture
- Deciding on interactivity
- Outlining and draft content
- Writing core content and create graphics
- Organising the content
- Creating site maps

- Applying principles of design
- Determining navigation
- Testing/evaluating prototype, *etcetera.*

The research was therefore carried out in two phases:

- The critical analysis of reported research and literature
- The design and development of the DILP.

1.6 Organisation of chapters

Table 1.1: Overview of the dissertation

Chapter	Title	Content
1	Introduction	• Background • Statement of the problem • Scope and objectives • Purpose of the research • Definitions • Research design and methodology
2	Profile of the South African student	• Generation Y • Demographics • Characteristics • Learning characteristics • Learning style preferences • Expectations of students – Generation Y
3	ILPs in academic libraries: a model	• Identification of criteria for such programmes • Characteristics • Presentation: o the format o offering techniques
4	The DILP in an academic library: a model	• Application of the criteria and characteristics for ILPs to the DILP • Presentation: o the format o offering techniques, for example availability 24 hours

Chapter	Title	Content
		a day, with or without human intervention
5	The design of the DILP	• Documentation of the design criteria: interactivity, site architecture and navigation features • Principles of design • Elements of design • Incorporation of media • Learner levels
6	The development of the DILP	• Deciding on the detailed content of the DILP • Content organisation • Actual creation of the program in FrontPage (authoring) • Additions and changes to the original content • Changes in the design of the DILP • Technical requirements for authoring • Checklists • Technical requirements for using the DILP • Evaluation and testing of the prototype • Producing the DILP
7	Conclusions and recommendations	• Summary of the main findings • Recommendations • Future research • Concluding comment

1.7 Summary

This chapter dealt with the background to the study, problem statement, purpose of the research, various definitions, research methodology and a chapter overview. The following chapter deals with the profile of the South African student, which is important for the design and development of the DILP.

Chapter 2

Profile of the South African student

2.1 Introduction

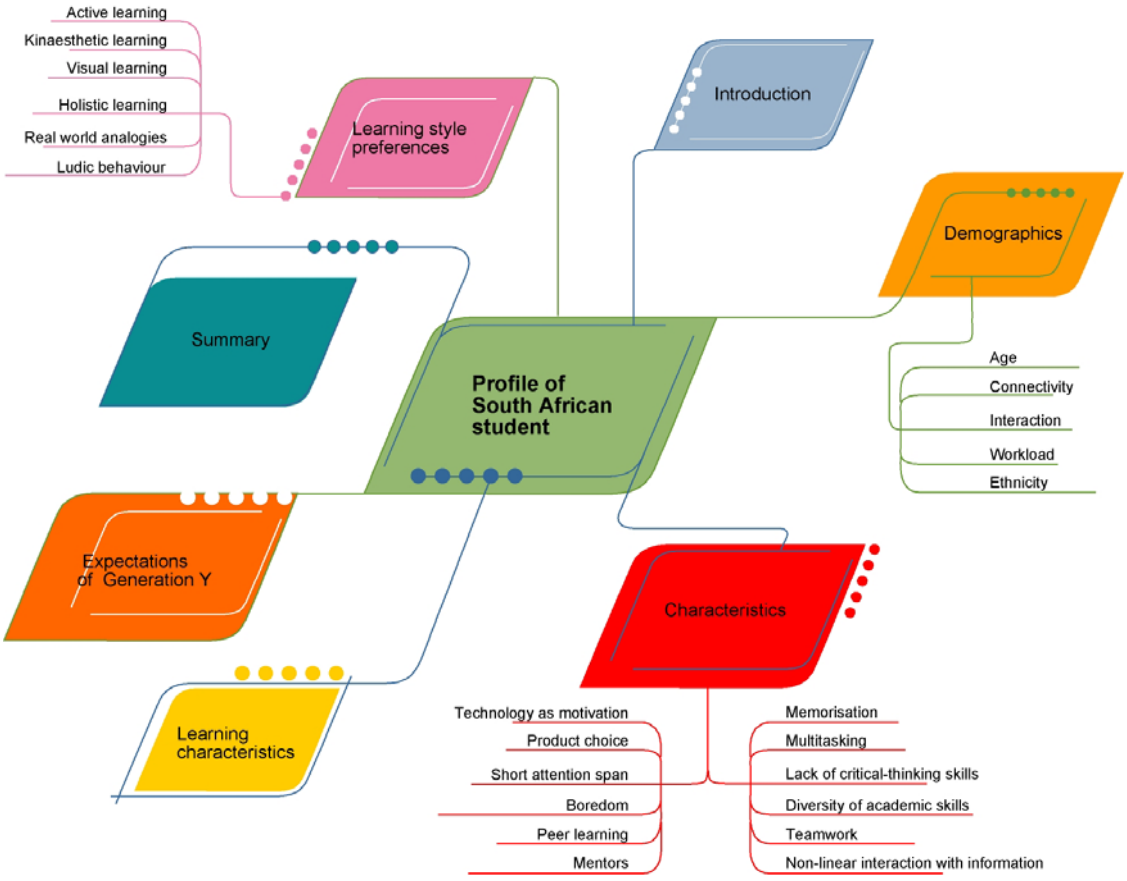
As explained in Chapter 1, section 1.1. Background, it is the task of librarians at higher education institutions to teach information literacy to students. These instruction sessions should, according to Hinchliffe (2001), change the students to become habitual askers of questions, seekers of new knowledge, critical thinkers and informed decision makers. To facilitate these changes, the librarians – as instructors – should know who these students are. According to Manuel (2002:196), the students of today are members of the so-called Generation Y.

There are various age-related generations, for example the Veterans (born before 1945), Baby Boomers (1946-1965), Generation X (1965-1979) and the latest one – Generation Y. Generation Y is a name for a "generation" comprising those born in the 1980s to present, and is the largest demographic grouping since the baby boom of the late 1940s to early 1960s (TheFreeDictionary, 2004b). People from Generation Y are also called Millennials or Nexters and fall in the 24 and younger age bracket.

Knowledge of one's client base is necessary to determine the design and development of a DILP (Cronje, 1997). The client base will be the people who will receive the instruction. In this case it will be the students enrolled at higher education institutions in South Africa. These students also fall within the Generation Y class. Therefore, many of the Generation Y characteristics are applicable to them. There are, however, also characteristics unique to South African students that need to be addressed.

The unique demographics, characteristics, learning style preferences, expectations and learning characteristics of Generation Y are explored in this chapter. The information will be incorporated in the design of the DILP. The following mind map (Figure 2.1) illustrates how the above-mentioned aspects are addressed.

Figure 2.1: Mind map to illustrate chapter content



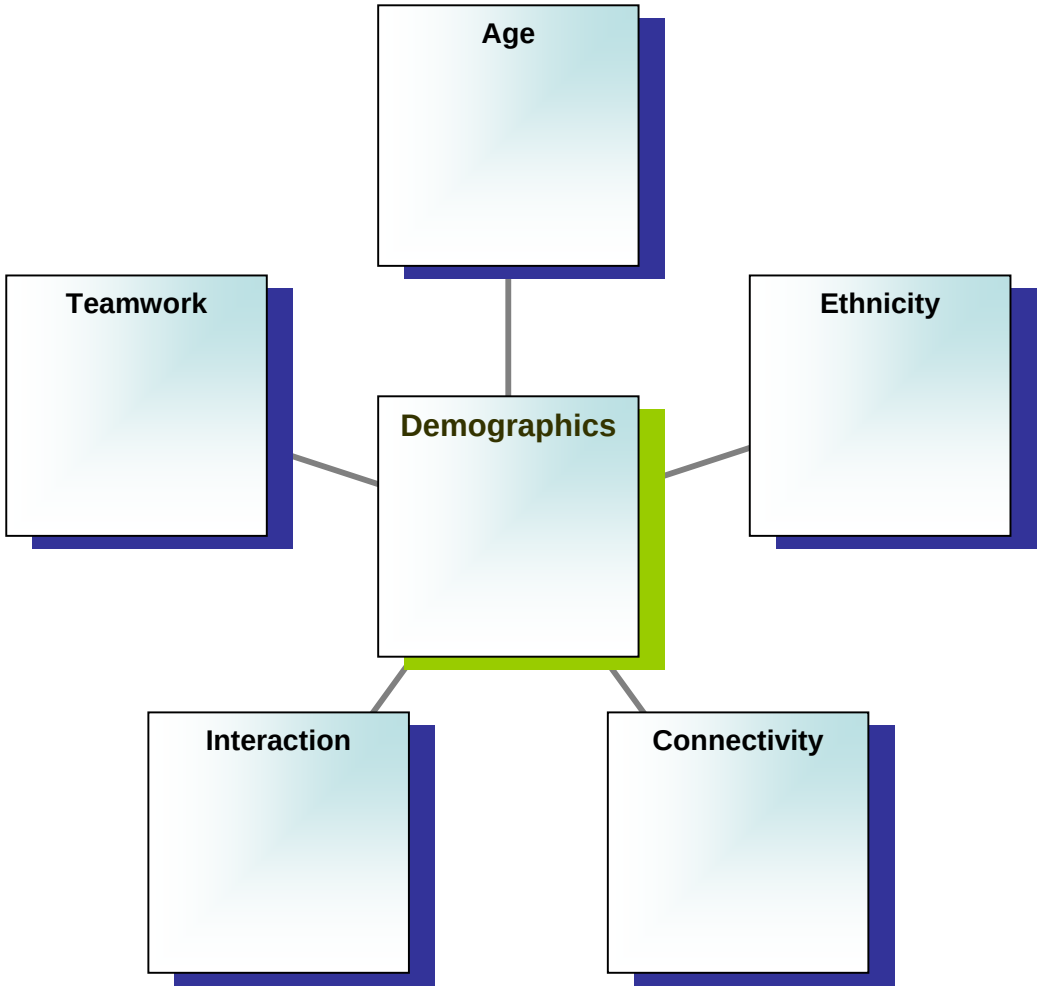
2.2 Demographics

The marketing sector uses the term *demographics* to determine when and where advertising should be placed so as to achieve maximum results (TheFreeDictionary, 2004a). This involves, for example, the age generation

band. Various categories of demographics were investigated, in order to determine when and where the DILP should be made available, how its content should be structured and what topics should be included to ensure optimum results.

Demographics can be divided into various categories (Faust, Ginno, Laherty & Manuel, 2001) and are illustrated in the Figure 2.2.

Figure 2.2: Demographics



2.2.1 Age

The age bracket of Generation Y is 18-24, in other words people born between 1980 and 2000. There are about 6 258 657 youths in South Africa between the ages of 18 and 24, representing approximately 14% of the South African population (Statistics South Africa, 2003). Approximately 10% of these youths are students at higher education institutions, as there are around 665 367 students in South Africa (Government Communications, 2003:209).

These students are from the younger generation and they will probably find computerised training, such as the DILP, easy. Egan (1988:543) points out that age is a powerful predictor of how difficult a user will find it to learn complex computer systems such as digital programs. Older generations lived in an era when computers did not exist, while the younger generation is better able to cope with the use of computers.

2.2.2 Ethnicity

Manuel (2002:197) points out that the students of today are the most ethnically diverse generation, where one in three is not Caucasian. Generation Y is even more diverse in South Africa, where one in 14 is Caucasian (Statistics South Africa, 2003).

The ethnicity of the group, in this case the Black cultural group, should be taken into consideration for the design and development of the DILP – as 60% of higher education students in South Africa are Black (International Marketing Council of South Africa, 2003). Some of the elements in the DILP, such as the graphics and names, should therefore be aimed at the Black population.

2.2.3 Connectivity

Regarding the connectivity of Generation Y, the vast majority (42%) of South Africa's Web users are younger than 25 years (Webchek Press Room, 2003). Webchek Press Room also reported that those in the 18-20 age group go online outside the home. This is mostly from Internet cafés and computer laboratories at higher education institutions.

Connectivity is important because it shows that the students of today are familiar with the operations of the Web. The DILP should therefore be designed and developed to be used in a Web environment.

2.2.4 Interaction

Faust et al. (2001), point out that Generation Y prefers action to observation. Action implies active learning and active learning techniques engage students in the learning process. Observation is merely reading and discussing and a DILP should be more action-orientated (Palloff & Pratt, 2003:131).

There are many possibilities for active learning, which should be incorporated into the DILP:

- Asking students to engage with real-life examples and problems
- Participation in simulations
- Researching issues and reporting back to a group
- Navigating and answering quizzes (Palloff & Pratt, 2003:131).

Based on the above recommendation, the DILP should therefore be designed to be action-orientated.

2.2.5 Work-load – too little time

Students, and especially first-year students, are reported to feel overwhelmed and pressed for time when they enter higher education institutions (Faust et al.,

2001). The units in the DILP therefore should be designed not to take longer than 30 minutes each to complete.

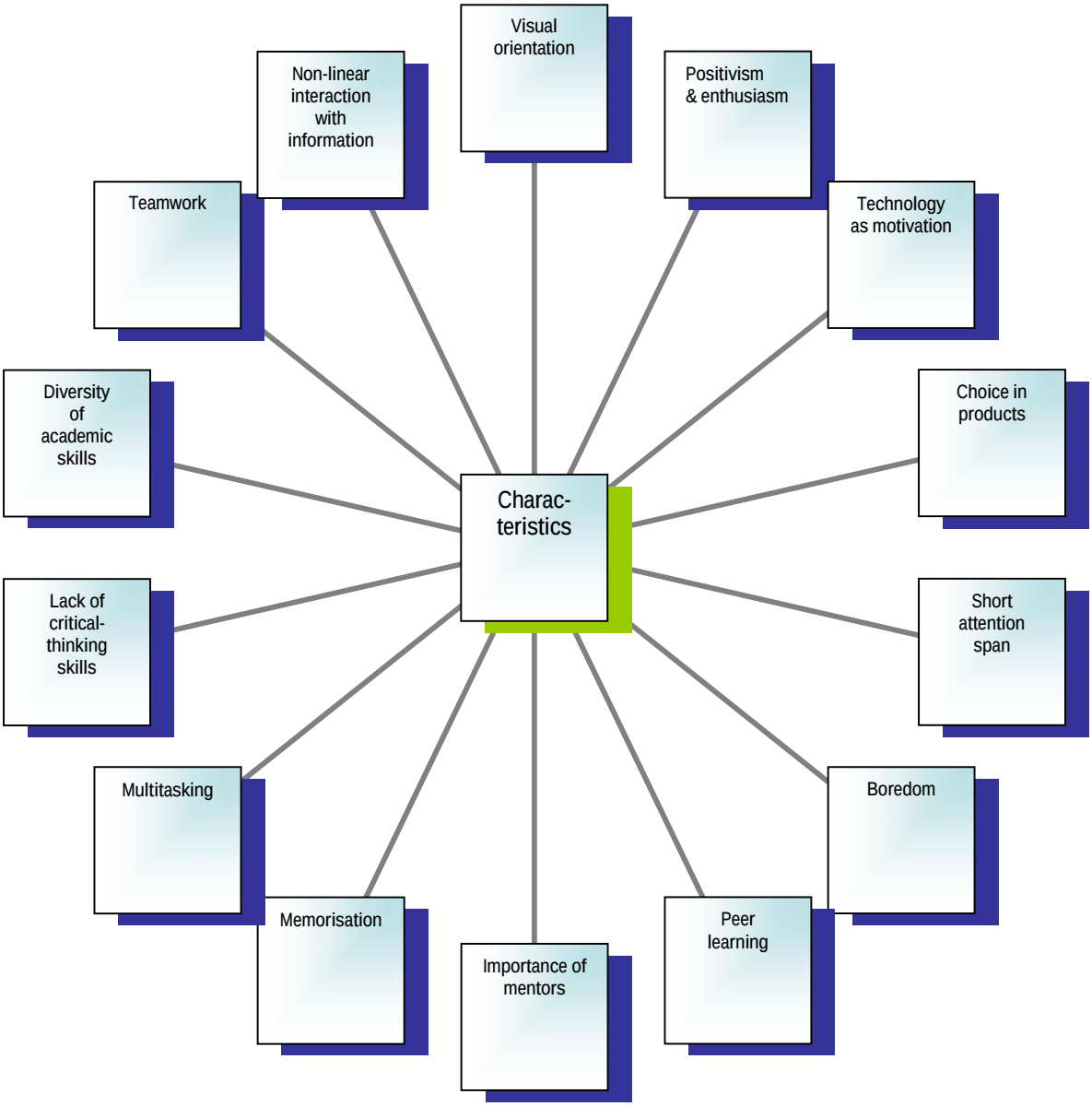
The above-mentioned demographics should be incorporated in the design and development of the DILP.

2.3 Characteristics

A ‘’characteristic’’ is the typical feature or quality that something or somebody has (Oxford advanced learner’s dictionary of current English, 2001a:182). It is important to understand and apply these student characteristics to the DILP as most human-computer interaction takes place on the level of the individual (Stander, 1997:13).

Figure 2.3 contains the various characteristics of Generation Y. A detailed description of each of these characteristics follows the figure and thereafter the implication of each characteristic for the design and development of the DILP is listed in table format.

Figure 2.3: Characteristics



2.3.1 Visual orientation

According to Faust et al. (2001), Generation Y students find pictures and images more accessible than text. This implies that the DILP will have to be visually orientated.

2.3.2 Positivism and enthusiasm

Generation Y students are generally optimistic, happy, positive and self-confident. They also have positive *views of* the potential of technologies and positive *abilities with* technologies (Manuel, 2002:195).

Generation Y has an enthusiasm for learning. Everything that seems like a learning opportunity, for example a new computer program, appears to attract them (Zemke, 2001). The fact that they are so positive and enthusiastic will probably enhance their participation in the DILP.

2.3.3 Technology as motivation

Faust et al. (2001) state that these students are motivated by technology, in other words computers, cellular phones, video machines, *etcetera*.

According to Manuel (2002:198), Generation Y students have an affinity for computers and will therefore master digital information literacy skills more easily. Altimier (2004) also suggests that technology should be used whenever instructing Generation Y, since they grew up with computers, cellular phones and other modern technologies.

The increase in the usage of electronic resources by students and the penetration of information and computer technology in the education sector stress the importance of technology in the lives of the students (Correia & Teixeira, 2003). Allerton (2001) therefore calls them e-learners.

2.3.4 Choice in products

According to Manuel (2002:203), Generation Y wants their education to match current entertainment products. They have a choice in products and would therefore want a choice in their education as well. The DILP that they are going to use should offer choices, for example they should be able to choose between different units and activities in the DILP.

2.3.5 Short attention span

Manuel (2002:205-206) blames the environment in which they grow up for the short attention span. They are used to video and computer games, whereas older generations grew up with board games.

The average attention span of a person is twenty to thirty minutes. However, according to Manuel (2002:207), the attention span of Generation Y is shorter. Lengthy presentations, as part of a DILP, would not work. The tempo should be varied to keep students interested.

2.3.6 Boredom

Manuel (2002:205) states that Generation Y has a low threshold for boredom. Boredom could be addressed by increasing opportunities where the students could engage, for example, with peers. They should be able to share certain findings with each other. This is a most effective way for students from Generation Y to learn.

Engaging the students in the DILP will also prevent boredom. Glenn (2003:242) suggests that the students should be engaged using multiple senses. The visual sense should be engaged by using text, graphics, videos and animation and the

aural sense should be engaged by using audio clips. Online interactions require touch and physical motion.

2.3.7 Peer learning

Manuel (2002:208) further points out that peer learning is important to them because they strongly identify with others of their age group. The reason for this is that they grow up in a society where most of them come from single-parent homes or homes where the father or mother works long hours – forcing them to rely on their peers. Apart from the fact that peer learning is important, Generation Y also has a need for mentors.

2.3.8 Importance of mentors

According to Altimier (2004), Generation Y is not as independent as Baby Boomers and therefore has a need for mentors. As a result of this, they want the person in charge to be accountable for training, career planning and for providing a safe environment (Zemke, 2001). The mentor should show them authoritative expertise. The mentor – in this case – can be the librarian responsible for the instruction of the DILP.

2.3.9 Memorisation

The unwillingness to memorise (Manuel, 2002:205) can be addressed in the DILP by repeated exposure to certain concepts. To teach students where to find digital information sources, the DILP would, for example, have to direct them to the same Web site, repeatedly. The Web site, in this instance, can be the library's portal listing the digital information sources.

2.3.10 Multitasking

According to Manuel (2002:206), Generation Y has the ability to multitask. They can watch television, while sending short messages on their cellular phones, or play on the computer and listen to music. Therefore single-tasking – such as reading a book – seems boring to them. The DILP should allow them to do several things at once. An example of multitasking is where the student evaluates Web sites. First, he/she needs to open the sites, view them and type his/her answer in a box. Thereafter he/she needs to compare his/her answers with those given in the DILP.

2.3.11 Lack of critical-thinking skills

Other characteristics, identified by Jacobson and Mark (2000:256), are the lack of critical-thinking skills and database searching proficiency to refine searches. Students can search the Web and come up with huge amounts of information, but many of the students need to learn how to focus their topics and critically evaluate and use the information they retrieve.

According to the Queen's University Stauffer Library (1998), the application of information is one way of involving critical-thinking skills as part of digital information literacy training.

2.3.12 Diversity of academic skills

The extreme diversity of academic/study skills found in the student population of today is another characteristic of Generation Y (Correia & Texeira, 2003). This is especially evident in South Africa, where the majority of students still receive limited and poor quality education (Darch & Underwood, 1999). The DILP could supply students, for example, with information about assignment writing skills.

2.3.13 Teamwork

Generation Y students are used to getting projects or assignments to complete in a group, therefore they prefer teamwork. They are also used to being organised to get things done and evaluated in a team (Zemke, 2001). This collaboration requires communication. Generation Y therefore expects to be in constant contact with one another as well as their mentor *via* computers and cellular phones. A possible implication for the DILP will be to give students the opportunity to work in groups.

2.3.14 Non-linear interaction with information

Another characteristic of Generation Y is that they are systematic, non-linear and participative. Faust et al. (2001) point out that students will learn more when the information is presented in a non-linear and non-sequential mode. They are used to non-linear text, since information is presented in a non-linear way on the Web (Manuel, 2002:201).

The Web – with its hyperlinks – transforms the way in which humans process information and people scan, rather than read, the information on the Web.

The characteristics with their implications for the design and development of the DILP are tabled below.

Table 2.1: Characteristics of Generation Y and the implications for the DILP

Characteristic	Implication
Visual orientation	The DILP should be visually orientated and should use appropriate graphics, animation and interactive exercises to

Characteristic	Implication
	enliven it (Creanor, Durndell & Primrose, 1996:135).
Positivism and enthusiasm	Positive abilities with technology should ease the usage of the DILP, since new technologies such as computers figure positively in Generation Y's worldviews (Manuel, 2002:198). The fact that it is a *digital* ILP, suggests that the program can only be used in a computerised environment.
Technology as motivation	Technology – in this case – refers to computers. To motivate the students, computers are used to instruct them. The DILP should therefore be delivered in a hands-on computer laboratory where online access to the Web is available.
Choice in products	Students should be able to choose between the units that they want to view. They should also be able to go back to previously viewed units and, in some instances, choose between two different ways of working through a specific theme in a unit.
Short attention span	Time for completion of units in the DILP should not exceed 30 minutes per unit.
Boredom	The DILP should engage students and present them with various activities to complete. Students should, for example, work in a group to identify and find digital information sources on a topic of their choice and then compile a bibliography. A variety of question types should be asked. Answers to certain questions should be given in fill-in-boxes. In other questions only the possible correct answer should be chosen.
Peer learning	Certain activities should involve peers. Students should, for

Characteristic	Implication
	example, work in a group to identify and find digital information sources on a topic of their choice and then compile a bibliography.
Importance of mentors	The mentor, working in co-operation with the students and the DILP, can be a human mentor. As the mentor should be an experienced person who advises and helps the student over a period of time, it is recommended that a librarian should be the mentor as librarians usually have knowledge of information literacy and digital information sources.
Memorisation	The same layout and style should be used through-out the program, to facilitate memorisation. The content for each unit should always be displayed on a certain part of the screen.
Multitasking	The student should, for example, evaluate Web sites. Thereafter he/she needs to compare his/her answers with those of the DILP and then post his/her answers to a discussion board.
Lack of critical-thinking skills	Proficiency in database searching will assist in overcoming the lack of critical-thinking skills. The DILP should use the application of information. This can be if students need to apply their knowledge of evaluating Web sites by completing an activity.
Diversity of academic skills	The DILP should contain a unit with information about study/academic skills and give an overview of writing skills, *etcetera.*
Teamwork	Some assignments in the DILP should be completed as a team.
Non-linear	The DILP should use hypertext, since hypertext in its essence is

Characteristic	Implication
interaction with information	non-linear and links related topics/text. Hypertext allows the student to pursue trails through a document by means of links (Wertheimer Meyer & Baber, 1996:304).

2.4 Learning characteristics

Cronje (1997) points out that students are predominantly young adults. Their learning characteristics will therefore be the same as adult learning characteristics. The characteristics, according to Ference and Vockell (1994:25), are listed and then briefly discussed.

The following are learning characteristics:

- Active students
- Experience-based
- Hands-on
- Task-centred
- Problem-centred
- Solution-driven
- Value-driven
- Skill-seeking
- Self-directing
- External motivation
- Internal motivation.

Young adults from Generation Y prefer **active learning**. It means that they are willing to participate and prefer to be active rather than passive.

These students bring some **prior life experiences** and education to the learning situation; they are self-reliant and operate as independent individuals who want to accomplish things. They focus their attention on **real-world problems** and acquire skills through concrete, **hands-on experiences**. The learning process will be facilitated by doing rather than listening.

In day-to-day life they are faced with some important matters and will therefore focus their attention on real-world situations.

In order to solve real-world problems, they will seek out new and **improved skills**. Tasks are performed in order to reach a goal or solve a problem; they are therefore **task-centred** and **solution-driven**. They will focus on a problem that could be encountered in a particular life situation.

Generation Y students need to know why they should learn something before they undertake to learn it. They want to benefit from the learning experience and they are therefore **value-driven**.

Learning also takes place by **self-direction**, which means that they are independent and responsible for their actions. Learning is also **externally** and **internally motivated**. **External motivation** means that students are motivated by factors such as better jobs and higher salaries, whereas **internal motivation** means that learning will bring about recognition, career satisfaction, quality of life, *etcetera.*

Salopek (2000) adds that learning should make sense, in other words some background should be given and also an explanation of how it could benefit their careers.

All the above-mentioned learning characteristics should, as far as possible, be incorporated in the design and development phase of the DILP.

2.5 Learning style preferences

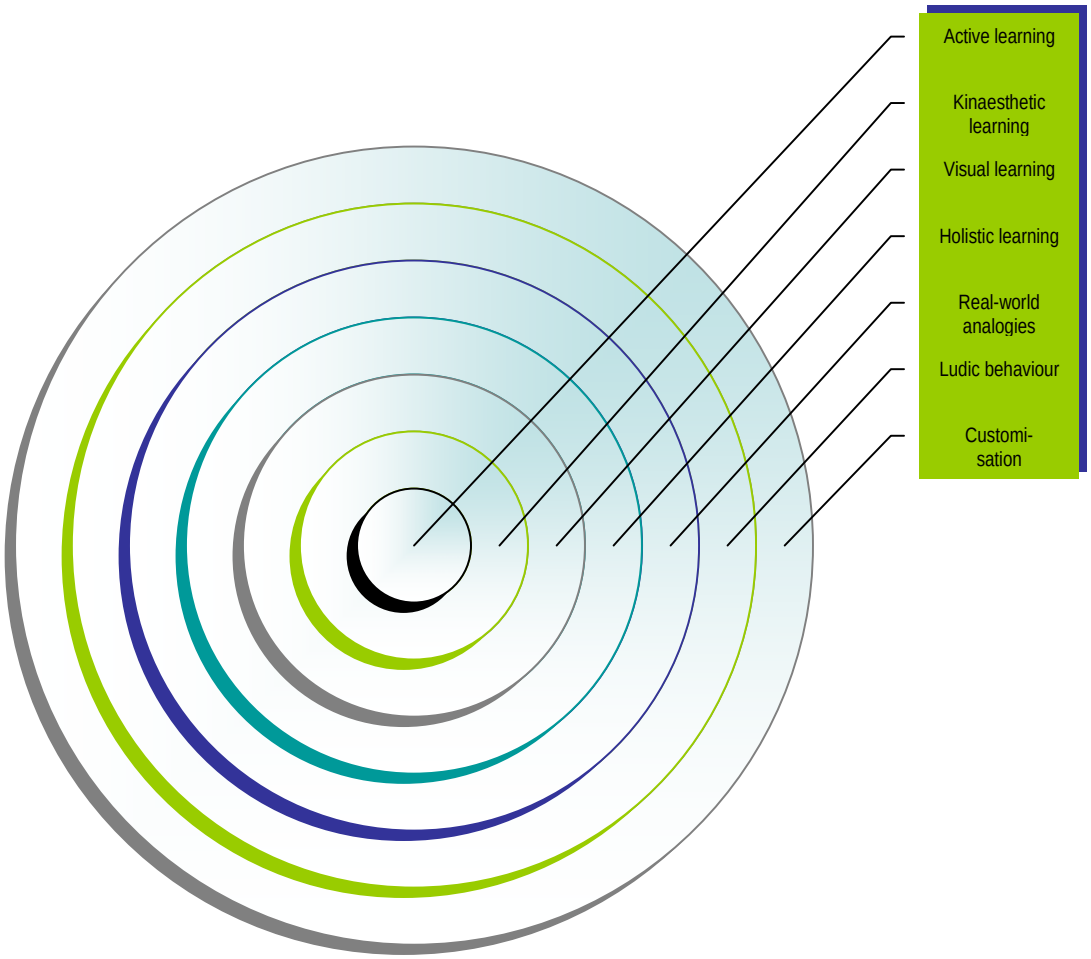
Generation Y learns more when taught in accordance with their learning style preferences (Manuel, 2002:195). The various learning styles will therefore be investigated. Brown, Murphy and Nanny (2003) agree by stating that:

> It is no longer effective to provide information literacy instruction that is thought to be ‘’good for’’ college students, but rather, instruction must focus on the learning styles and preferences of the target population.

According to Manuel (2002:195) and Faust et al. (2001), it is clear that the students of today prefer an active, kinaesthetic and visual learning style.

The following figure illustrates the various learning styles – working towards the common coal of teaching digital information literacy skills.

Figure 2.4: Learning style preferences



2.5.1 Active learning style

An active learning style means that the person learns by means of small-group brainstorming, discussions, *etcetera*. The active mode also suggests that instruction should not be given in a traditional classroom, but in a hands-on computer laboratory where the students search computerised catalogues, databases and the Web. Manuel (2002:200) also found that students favour a situation where the instructor changes from the lecturing style to the incorporation of experiences. Instead of lecturing on the topic, for example the

evaluation of Web sites, the students should be able to read about evaluation in the DILP and then evaluate certain Web sites given to them.

2.5.2 Kinaesthetic learning style

A kinaesthetic learning style means that a person learns by moving around and handling physical objects. A study, undertaken at the California State University by Faust et al. (2001), showed an increase in the students' learning when the information literacy instruction changed to a more kinaesthetic mode.

Using the DILP, students should search *via* the Web for a digital book; they can then go to the site and also download the digital book.

2.5.3 Visual learning style

A visual learning style (also called graphic learning) is applied when the instruction uses images and not the printed word. Video clips could therefore be used to instruct the students on how to use the DILP. Faust et al. (2001) state that ''Generation Y students find pictures and images more accessible than text''.

The reason for this is that they grew up with television, videos, games, computers and the Web. Correia and Teixeira (2003) agree that students are faced with the presence of visual information in every sphere of human activity.

Educators also found that students retain only ten percent (10%) of what they read, but 30% of what they see (Bradley, s.a.). Other studies showed that students do better in searching databases when visual instead of verbal directions were used (Faust et al., 2001).

Exercises aimed at promoting visual learning styles could include a simulation of a database with appropriate graphics to engage the student's interest.

2.5.4 Holistic learning

Miller (1999:46) points out that holistic learning refers to the provision of a broader vision of education and human development. The three key elements of holistic instruction are balance, inclusion and connection.

2.5.4.1 Balance

Balance refers to a balance between various learning emphases, for example learning and assessment, individual and group learning as well as analytical thinking.

2.5.4.2 Inclusion

Holistic learning supports the inclusion of students from different races and abilities and is therefore suitable for the ethnically diverse Generation Y.

''Inclusion'', according to Miller (1999:46), also suggests that different teaching and learning strategies are used. These refer to the transmission, transaction and transformation of learning.

Transmission is the one-way flow of information from the DILP to the student, where the focus is on the accumulation of facts and basic skills. Transaction is the interaction between the student and the DILP and focuses on the development of cognitive skills and the solving of problems. Transformation refers to the development of physical, emotional, aesthetic, moral and spiritual growth of the student.

2.5.4.3 Connection

The term ‘’connection’’ refers to the connection among subjects, among students and to the self, which all reflect holistic learning. The student should, for example, be able to make a connection between a digital information need and the Web with its digital information sources, which can satisfy the information need.

The DILP should contain all three key elements in order to facilitate holistic learning. Correia and Teixeira (2003) state that digital information literacy should has a vision which is holistic in nature.

2.5.5 Real-world analogies and elaboration strategies

Faust et al. (2001) suggest that instruction should take place by using analogies. This means that a relationship is built between the material to be learned and prior knowledge or experience. Assignments should be changed from a non-analogous format to an analogous format.

Elaboration strategies, according to Willoughby, Wood and Kraftcheck (2003:59), can be used in the facilitation of teaching new information to individuals of all ages. Examples of elaboration strategies are: imagery and questioning (answering ‘‘why’’). The ‘’why’’ question prompts and activates students to connect new information with existing knowledge, by searching their own body of knowledge.

2.5.6 Ludic behaviour

According to the TheFreeDictionary (2005), ‘’ludic’’ literally means playful, and one of the expectations of Generation Y is that learning should be fun. Another expectation is that the instructor should be responsible for their learning.

The DILP should therefore contain entertaining activities and should be of a ludic learning nature (Faust et al., 2001). An example of this would be an assignment where the students must visit certain search engines and then complete a search engine activity chart.

2.5.7 Customisation

The customisation learning style implies that the program should be self-paced and contain customised products and experiences, as Generation Y shows a preference for these (Faust et al., 2001). The program should be designed so that students can work through the DILP in their own time.

One unit could be designed, for example, to teach about the evaluation of Web sites. South African products, like the Sunday Times' Web site could be searched for Lebo M. – the Grammy Award-winning composer – as an example of a customised South African product.

The DILP should allow the student to choose what he/she wants to read. The assessment of abilities should also be the choice of the student. The DILP should, for example, provide the student with the choice to go to any unit of his/her choice. If he/she only wants to read about Web sites and databases, he/she should be able to go to only these two topics. By providing the student with quizzes at the end of each unit, he/she can choose to take the quiz or go to another unit. This provides him/her with a choice in the assessment of abilities.

All the above-mentioned learning characteristics should, as far as possible, be incorporated in the design and development phase of the DILP.

2.6 Expectations of Generation Y

Zemke (2001) highlights the expectations of Generation Y.

They expect

- to be provided with work that really matters.
- to balance clearly delegated assignments with freedom and flexibility.
- to be increasingly responsible.
- to get to know people and their capabilities.
- the establishment of mentoring relationships.
- the creation of a comfortable, low-stress environment.
- flexibility in scheduling.
- to be focussed on work, but be personable and have a sense of humour.
- not to be treated as teenagers.
- to be respected and they will be respectful in return.
- to be provided with constructive feedback.
- to be rewarded when they have done a good job.

These expectations of Generation Y should also be incorporated into the design and development phase of the DILP.

2.7 Summary

This chapter focused on the demographics, characteristics, learning style preferences, expectations and learning characteristics of Generation Y students. The implications of these for the design and development of the DILP were also dealt with.

As Manuel (2002:196) states in her article:

> it behooves librarianship to acknowledge and accommodate Generation Y …. because students not intrinsically motivated learn better when taught in accordance with their learning style preferences …. improvements in students' attitudes and performance correlated with shifting teaching methods and materials for required information literacy …. Gen Y display some unique characteristics …

ILPs in academic libraries will be discussed in the next chapter.

Chapter 3

ILPs in academic libraries: a model

3.1 Introduction

Chapter 2 concluded that most of the students using academic libraries in South Africa are from Generation Y. That means that they are technologically advanced. They can, for example, use the Web, are motivated by technology such as computers, have the ability to perform more than one task at a time and interact in a non-linear way with information.

Although Dupuis (1999) agrees with the above, the author states that very few of the Generation Y students fully understand and are able to apply the fundamental principles of information literacy. Marcum (2002:1) supports this viewpoint by stating that information literacy remains a major focus and purpose of librarianship. The ILP has become more important than ever.

In recognising the value of the ILP, a pilot project for information literacy was established in South Africa in 1995. One of the primary objectives of this project – named the INFOLIT project – was to investigate ILPs at higher education institutions (Underwood, 2002:6). Since then, there have been numerous efforts to establish ILPs at higher education institutions in South Africa.

Despite these attempts, a study – launched in 2001 by Nassimbeni and De Jager – indicated that no **model** for the provision of ILPs at higher education institutions exists (Underwood, 2002:8).

It is therefore the aim of this chapter to describe a comprehensive ILP model. The model should serve as an example for academic libraries on how to compile their own or customise the model for their specific needs.

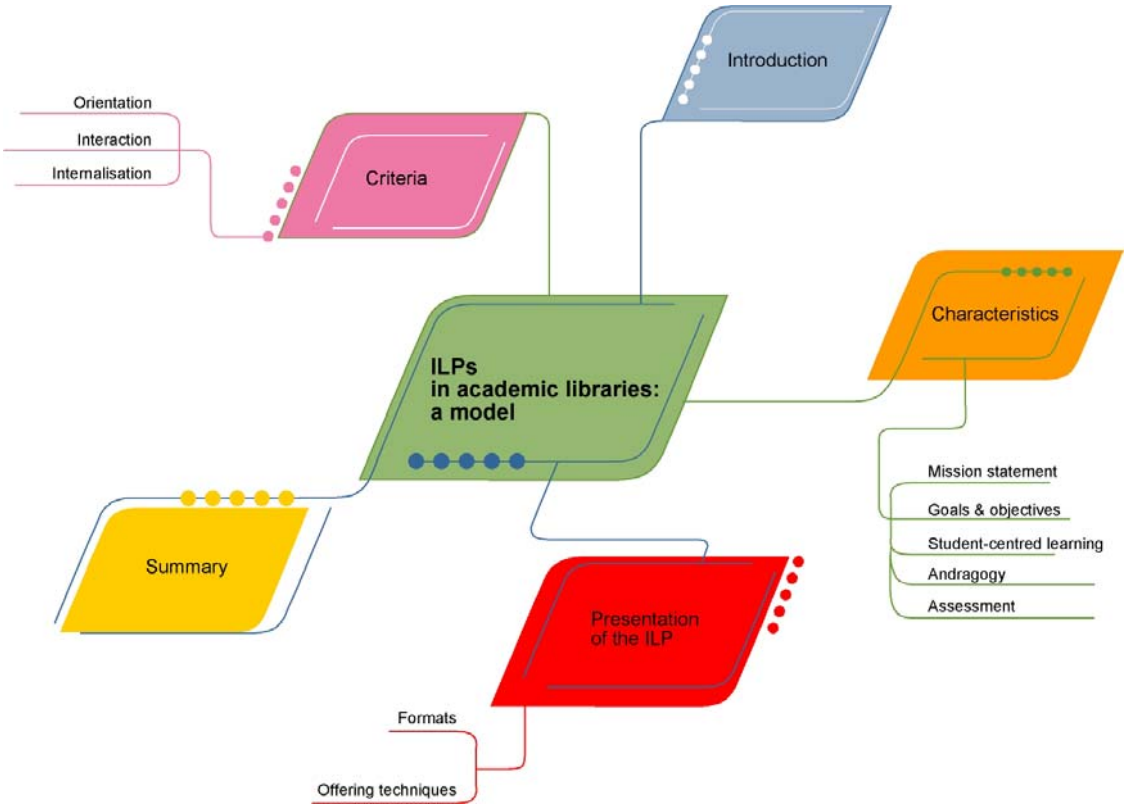
The purpose of this chapter is to determine

- the **criteria** for a model ILP.
- the **characteristics** that a model ILP should comply with.
- the **presentation** guidelines of a model ILP.

It is important to describe a comprehensive ILP model, as it was stated in Chapter 1, section 1.2.1, that a search for an all-embracing DILP model did not produce any results. Subsequently the DILP had to be based on the ILP model.

The following figure gives an overview of this chapter.

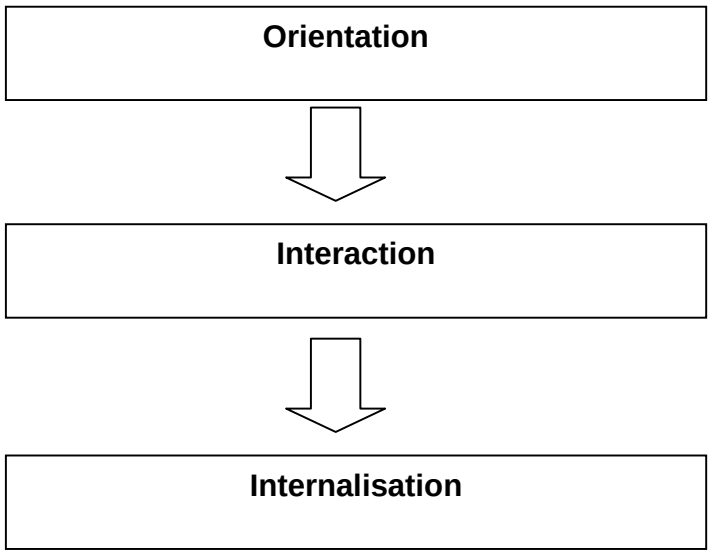
Figure 3.1: Mind map to illustrate chapter content



3.2 Criteria for a model ILP

One of the most important criteria for a **model ILP** is that it should consist of various steps and activities. These steps, identified by De Jager and Nassimbeni (2002a:8), are depicted in the following figure:

Figure 3.2: Steps in a model ILP

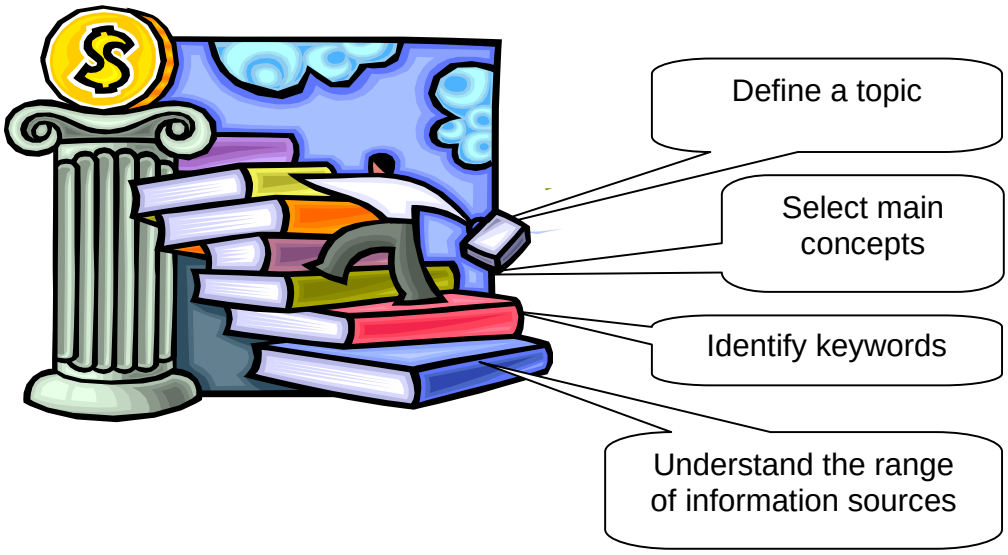


The following sections illustrate the activities in the various steps – ensuring a model ILP.

3.2.1 Orientation

 Orientation enables the student to situate him/herself in the world of information (De Jager & Nassimbeni, 2002a:4). Figure 3.3 depicts the student in the orientation step of the ILP. The speech bubbles illustrate the activities in this step.

Figure 3.3: Activities in the orientation step



The programme should allow the student to define the topic in the search for information. The next activity is the selection of main concepts in a topic, followed by the identification of keywords to search for information on a topic. The programme should then make it clear to the student that a range of information sources is needed to research a topic.

Orientation in the ILP is important, as students from Generation Y need to learn how to focus their topics. Orientation should therefore address the issue of the lack of critical-thinking skills – as discussed in Chapter 2, section 2.3.11.

3.2.2 Interaction

''Interaction'' is the continuous transfer of information in both directions between information sources (books, journals, *etcetera)* and the person (student) using it (Oxford advanced learner's dictionary of current English, 1995a:621).

The interaction between the information source and student is described in Table 3.1, by listing the activities of interaction and then explaining the activity. The information in the table has been synthesised from the works of the following authors:

- De Jager & Nassimbeni (2002a:8-9)
- Haberle (2002:26)
- Indiana University Bloomington Libraries (1996)
- McHenry Country College Library (2002).

Table 3.1: Interaction activities

Activity	Explanation of activity
	
To choose from a range of information sources and also to choose different sources for different information needs.	• Choose from books, journals, encyclopaedias, compact disks, videos, library catalogues, *etcetera.* • Choose between subject specific or general information sources.

Activity	Explanation of activity
To determine keywords, synonyms, *etcetera* to search the information sources.	• Use a search strategy of keywords, synonyms, *etcetera* to search information sources.
To select, locate and access the information.	• Select the appropriate information source, by locating it in the library, for example on the shelf. • Retrieve the information physically, for example taking the book from the shelf. • Access the information by looking for the information in the selected information source.
To quote and cite others' work correctly.	• Use a citation and bibliographic reference guide for quoting and citing. • Maintain a list of information sources used, for example compiling a bibliography.
To know about copyright and plagiarism.	• Understand copyright, for example not to photocopy a whole book and then sell it for a profit. • Avoid plagiarism by citing and quoting.
To know about issues such as currency, bias and authority.	• Understand the issues, for example to ask him/herself questions about when the information was published – therefore understanding currency.

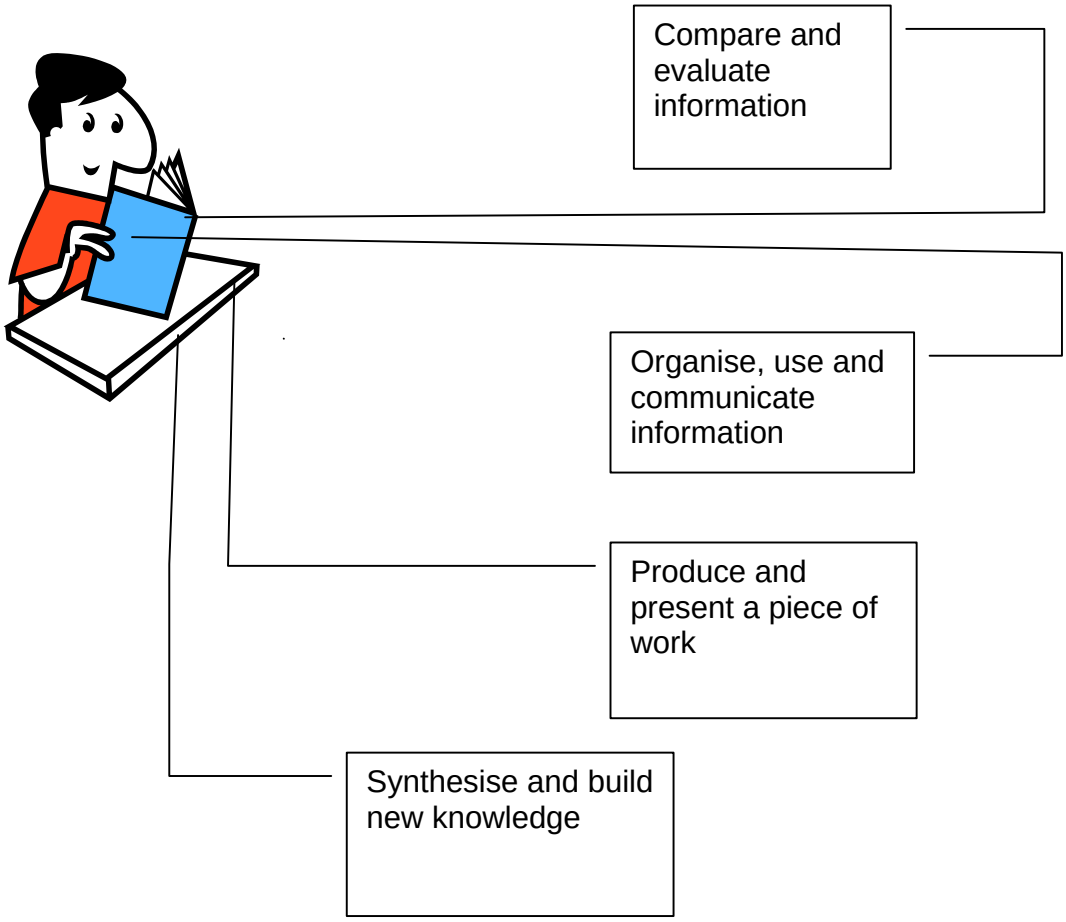
In Chapter 2, section 2.2.4 it is explained that Generation Y prefers action to observation, thus ensuring active learning. Interaction is important as the student needs to interact with the information source. A student could, for example, search on the online public access catalogue (OPAC) for a book, go to the shelf to retrieve the book and then identify the information in the book.

3.2.3 Internalisation

''Internalisation'' means that the student must make the information part of him/herself, by absorbing the information through repeated exposure to it (adapted from the Oxford advanced learner's dictionary of current English (1995b:624)).

Internalisation is done by providing certain activities in the ILP. These activities are illustrated in Figure 3.4.

Figure 3.4: Internalisation activities



The activities are briefly discussed.

Compare and evaluate information

In order to compare and evaluate information from different sources, the ILP allows the student to consider the following:

- Relevance
- Timeliness
- Reliability
- Coverage
- Accuracy.

Organise, use and communicate information

To organise, use and communicate information, the ILP

- shows the student the layout of an assignment/research project (the layout can be the title or main and subheadings of an assignment, *etcetera).*
- indicates which information from the information sources should be used for an assignment/research project.

Produce and present a piece of work

To produce and present an organised piece of work, the ILP

- shows the student how to write an assignment/research project, either handwritten or typed.
- indicates to the student how he/she should present his/her assignment/research project to his/her peers.

Synthesise and create new information

To ensure synthesising, the ILP

- explains to the student that he/she should combine separate ideas from different information sources and then create an organised piece of work.

It is important to take **internalisation** into consideration when designing an ILP for Generation Y, as students from this Generation are active learners (Ference & Vockell, 1994:25) and will appreciate the fact that they can be active in producing and presenting a piece of work such as an assignment.

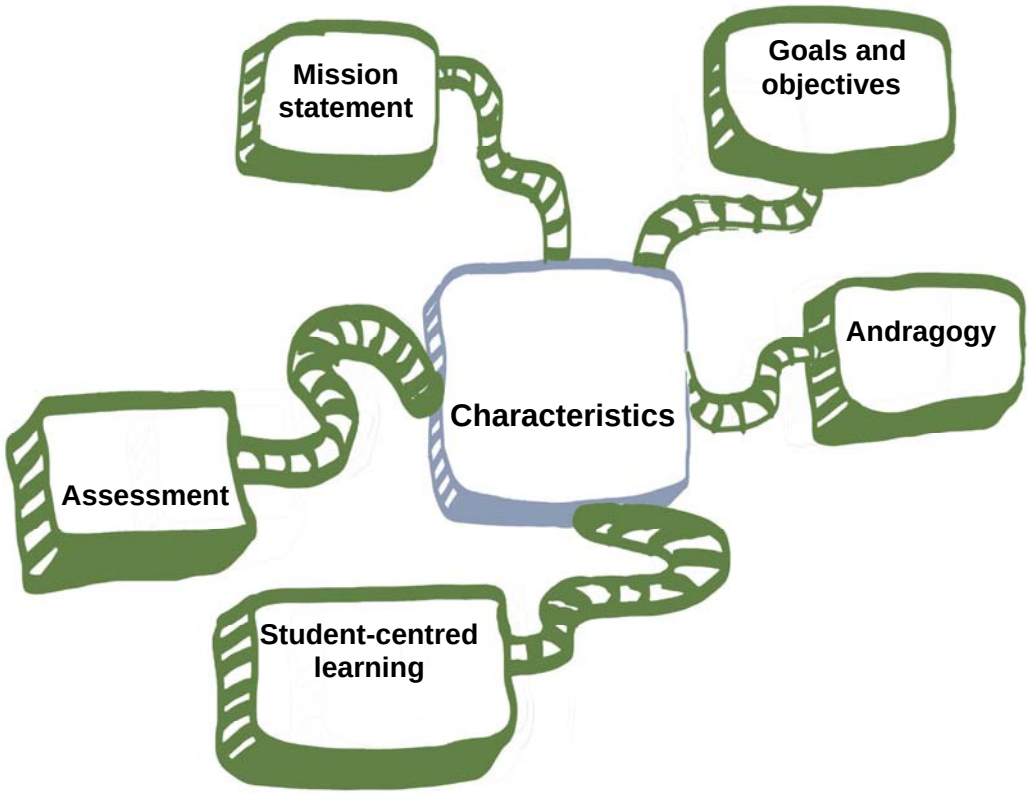
In Chapter 2, section 2.3.11 it was pointed out that Generation Y lacks critical-thinking skills. When information from different sources is compared and evaluated by using certain criteria such as timeliness, critical thinking takes place, which leads to the development of critical-thinking skills (Grafstein, 2002). Internalisation will therefore develop critical-thinking skills.

3.3 Characteristics of a model ILP

A model ILP should have certain characteristics (De Jager & Nassimbeni, 2002:8a). Although various library and information associations compiled **standards** with which ILPs should comply, only the ACRL (2005b) identified and described the **characteristics** of ILPs that illustrate best practices. These characteristics are intended to assist in the development of ILPs.

Figure 3.5 gives a summary of the characteristics and is followed by a discussion of the identified characteristics.

Figure 3.5: Characteristics of an ILP



3.3.1 Mission statement

The mission statement describes the overall purpose of an organisation (ACRL, 2005a). For the purpose of this study the mission statement will describe the overall purpose of the ILP.

According to the ACRL (2005b), the mission statement should also include a definition of information literacy and consider the anticipated contributions and benefits.

The mission statement for the ILP will therefore read as follows:

Mission:

The Information Literacy Programme strives to develop information literate students. Information literacy is the ability to understand and use information in multiple formats from a wide range of sources.

3.3.2 Goals and objectives

According to the ACRL (2005a), goals are statements of what the organisation wishes to achieve and the objectives are the short and long-term results.

For the purpose of this study the goals and objectives relate to the ILP.

Goals and objectives are important for an ILP as they reflect what the student should learn during the use of the programme.

Table 3.2 contains the goals (what the ILP wishes to achieve) and the objectives (stating the short and long-term results of the ILP).

The goals and objectives were synthesised from various ILPs, as no comprehensive goals and objectives from one particular library or organisation could be found for an ILP.

Table 3.2: Goals and objectives for an ILP

Goals	Objectives
Goal 1: The student will have the ability to articulate and focus on an information need.	**Objectives:** The student can • when given a topic, refine and formulate the given information need. • explore general information sources, to become more familiar with a topic. • refine the focus of the information need.
Goal 2: The student will understand the structure and format of information.	**Objectives:** The student can • define different information formats. • describe the structure of printed information sources. • identify, locate and navigate collections, for example the periodical section.
Goal 3: The student will develop effective information search and retrieval strategies.	**Objectives:** The student can • select appropriate access tools, for example catalogues, indexes, *etcetera,* to identify and locate information sources. • identify the access points to information sources. • understand the nature and use of

Goals	Objectives
	controlled vocabulary for accessing information. • locate the information sources.
Goal 4: The student will develop skills to critically evaluate and select appropriate information sources.	**Objectives** The student can • distinguish between popular and scholarly material. • distinguish between primary and secondary sources. • distinguish fact from opinion. • evaluate sources for validity and currency. • evaluate the credibility of the author(s) of the work.
Goal 5: The student will be able to effectively apply information.	**Objectives:** The student can • synthesise the information found. • use citations correctly. • document the information.

(Indiana University Bloomington Libraries, 1996; McHenry County College Library, 2002; Murray Library, 1999).

3.3.3 Andragogy

Andragogy refers to the education and teaching of adults (Dewald, 2003:47). Although the students from Generation Y are not all necessarily adults, it is argued that, since they emerge from an educational institution such as a school, they are considered mature people and therefore adults (Knowles, as quoted by Dewald, 2003:48). The study will thus focus on the andragogical learning characteristics which should be included in the ILP.

One of the learning characteristics is the learner-centred characteristic. ACRL (2005b) refers to this as student-centred learning.

3.3.4 Student-centred learning

Student-centred learning means that students work, both in groups and individually, to explore problems and find solutions (Harmon & Hirumi, 1996). It is important to apply student-centred learning to the ILP, as it is pointed out in Chapter 2, section 2.3.13 Teamwork, that Generation Y prefers to complete a project in a group and they want to be actively involved in the learning process.

3.3.5 Assessment

Assessment is an activity to measure student learning (ACRL, 2005a). The ILP should therefore measure what the students have learned during the programme. Since Generation Y is **achievement orientated**, and would like to know whether they have learned and achieved anything by doing the ILP, it should include assessment.

It is best to have a variety of assessment methods, since Generation Y prefer to have choices (refer to Chapter 2, section 2.3.4).

The following are methods of assessment which can be used in ILPs:

- Quizzes
- Oral defense
- Essays.

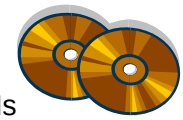
The above-mentioned methods will be suitable to use for Generation Y as they need to **do** things (quizzes and essays) and **reach** people (oral defense) of their own age (Miller, 2003).

3.4 Presentation of the ILP

A ''presentation'', according to the Oxford advanced learner's dictionary of current English (2001b:918), is the way in which something is offered, shown or explained to others. Traditionally, ILPs have been presented in various formats. These formats are listed in the following table:

Table 3.3: Formats of ILPs

Paper formats	Description
Manuals 	• Manuals are books containing information and practical instructions on a given subject (Oxford advanced learner's dictionary of current English (1995c:714). • The manuals used for an ILP will typically instruct students on how to use the catalogue.
Hand-outs 	• Usually contain main points, which are photocopied and given to students, to refer to after the instruction session (Barclay, 2003:141).

Electronic formats	Description
Stiffy disks  and  CD-ROMs	• Stiffy disks and CD-ROMs can also be used to present the ILP. • The information on how to quote sources can be saved onto these electronic formats and given to students to work through. • They should apply the knowledge afterwards by doing exercises, for example on quotations.
Slide  presentations	• Slide presentations can also be used to present the various units of the ILP. • Slides incorporating multimedia such as animation, video clips, music, *etcetera,* are used in oral presentations to present, for instance, the formats of information sources.
 Videotapes	• Videotapes can be shown to students. • An example would be a videotape containing a guided tour of the library.

All of the above-mentioned **formats** are used in conjunction with the following **methods** of ILP **delivery**:

- Formal classroom settings, where the librarian gives formal instruction
- One-on-one (individualised) instruction sessions in the library
- Scheduled workshops about the library
- *Ad hoc* speeches in classroom lectures
- Small group instruction in the classroom (Yu, 2003).

These methods are not scaleable – meaning that they are not delivered to a large number of students (Donnelly, 1998:147).

Most of these **formats** and **methods** are also not suitable for Generation Y. The following will explain why:

- Students from Generation Y prefer connectivity by using the Web. Manuals, hand-outs, *etcetera* do not provide this sort of connectivity (Chapter 2, section 2.2.3 Connectivity).
- Active learning, also preferred by Generation Y, is not supported by the formats and methods, since participation and reporting back to a group for instance, do not take place (Chapter 2, section 2.2.4 Interaction). The students need to gain access to computers (Barclay, 2003:150) to facilitate active learning.
- Peer learning and teamwork are not encouraged by the usage of the formats and methods. Generation Y needs to be in contact with peers in order to learn and prefer teamwork to complete an assignment (Chapter 2, section 2.3.7 Peer learning and 2.3.13 Teamwork). When working with a manual, for instance, no peer learning and teamwork can take place.
- The linear interaction with information is not preferred by Generation Y, as they prefer non-linear interaction with information (Chapter 2, section 2.3.14 Non-linear interaction with information). They are used to information presented in a non-linear fashion such as the Web and television.

The formats and methods need to be enhanced to suit Generation Y and should also be presented to larger numbers of students. The reason for this is the increased usage of the Web over the last years. Students are eager to utilise this medium to access material and information sources.

Librarians are also enthusiastic about using the Web to reach students for instructional purposes (Germain & Bobish, 2002:72) and provide them with digital library Web based materials.

This is discussed in Chapter 4, section 4.4. Presentation of the DILP.

3.5 Summary

This chapter dealt with the **criteria** for a model ILP, the **characteristics** of a model ILP and the **presentation** of the ILP. The implications of these for Generation Y were also discussed.

It was important to deal with the above-mentioned, as they should be applied to a **DILP**. The reason for this was mentioned in Chapter 1, section 1.3.4. Significance of the research – namely that no criteria, characteristics and presentation of a DILP existed prior to this study.

The criteria, characteristics and presentation of a DILP are discussed in Chapter 4.

Chapter 4

The DILP in an academic library: a model

4.1 Introduction

Thompson (2002) states that the development of information technology has created new dimensions in library collections since there are alternative sources and collections available outside the library.

Examples of these are:

- online catalogues as opposed to traditional card catalogues.
- full-text databases as opposed to bibliographic databases.
- electronic books as opposed to the printed formats, *etcetera.*

Librarians need to keep students up to date with these electronic sources, by instructing them in using these sources. This can be achieved by adjusting instructional programmes, for example changing from ILP to DILP (Thompson, 2002).

This supports the viewpoints on the characteristics of Generation Y (refer to section 2.3.3). Students want to manipulate computer technology to find and evaluate electronic information sources. The design, development and implementation of a DILP will fulfill more of the needs of students from Generation Y than an ILP.

As the term ‘’digital literacy/digital information literacy’’ occurs only twelve times in the literature since 1997 (Bawden, 2001:220), and little or no reference is made to *DILP* in the various databases, the researcher needed to find a model

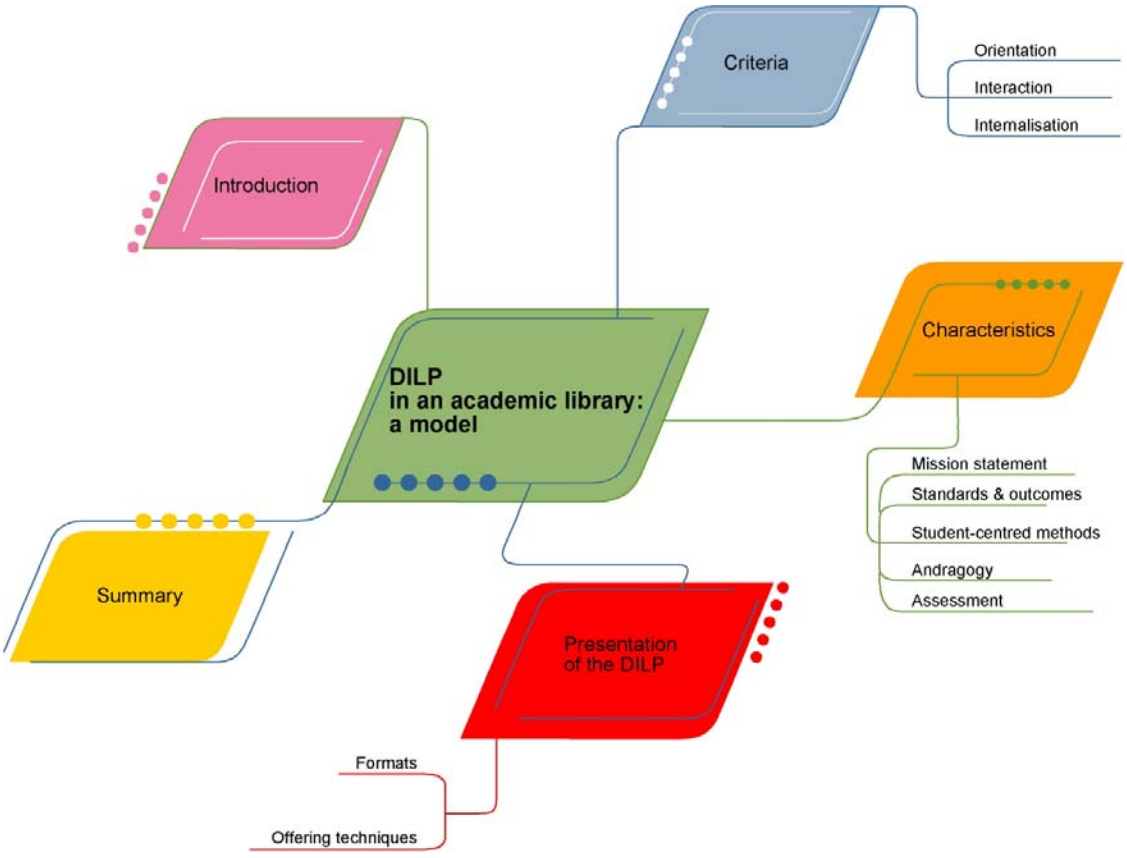
for the design of an effective DILP. This model is adapted from the model for an ILP as established in Chapter 3.

The following aspects, specifically related to a DILP, are therefore discussed in this chapter:

- The **criteria** for a model DILP
- The **characteristics** that a model DILP should comply with
- The **presentation** guidelines of a model DILP.

The following figure gives an overview of this chapter.

Figure 4.1: Mind map to illustrate chapter content



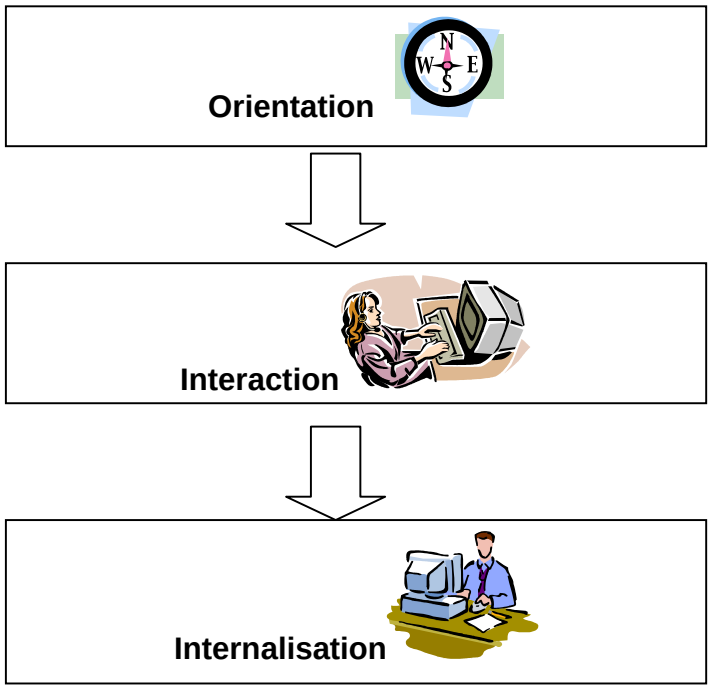
To ensure the effective development of a model DILP, criteria with which the model should comply had to be established. These criteria are compiled and discussed in the following section.

4.2 Criteria for a model DILP

As described in Chapter 3, section 3.2., the most important criterion for a model ILP is that it should consist of various steps and activities. The DILP should therefore also consist of various steps and activities.

The following figure depicts the steps.

Figure 4.2: Steps in a model DILP

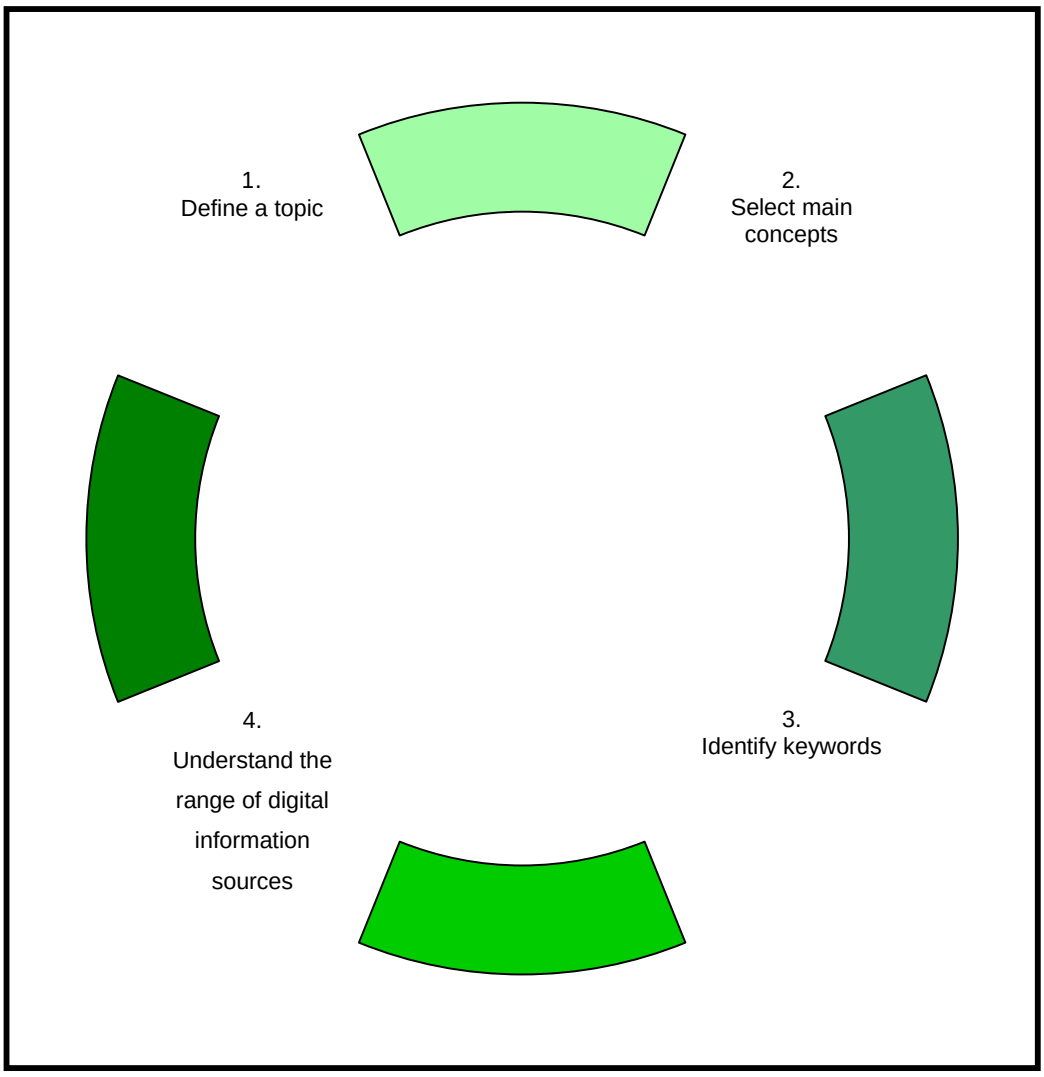


The following sections describe the activities in the various steps necessary for the successful development of a model DILP.

4.2.1 Orientation

De Jager and Nassimbeni (2002a:4) state that the student needs to situate him/herself in the world of information. Applied to the DILP, the student needs to situate him/herself in the **digital** world of information. In order to achieve this, the student needs to follow certain activities, all of which are illustrated in Figure 4.3.

Figure 4.3: Activities in the orientation step

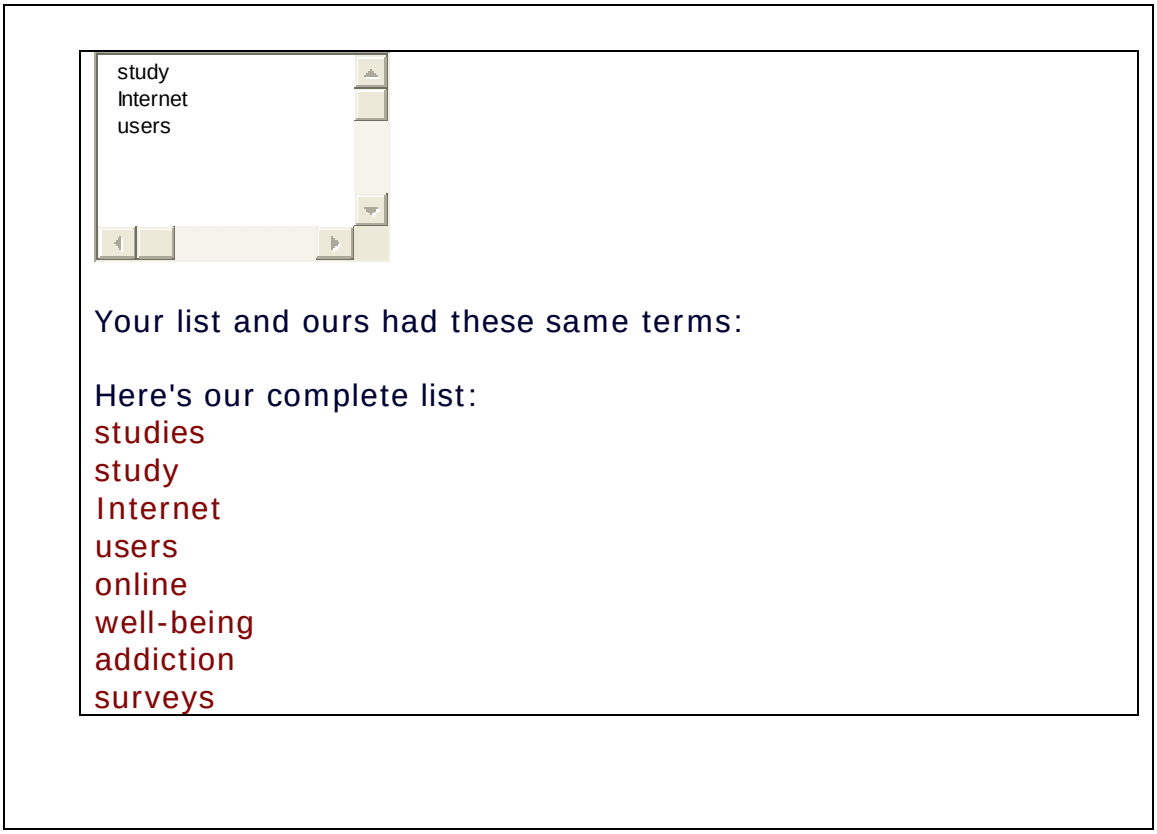


The DILP, just like the ILP, should allow the student to define the topic to be researched. The next activity should be the selection of main concepts in a topic, followed by the identification of keywords to search for information on a topic.

This is done by allowing the student to type the main concepts and identified keywords into a box provided by the DILP (illustrated in Figure 4.4). The DILP then supplies the student with other possible concepts and keywords – providing

immediate feedback. This differs from the ILP where the student merely had to write the concepts and keywords on a piece of paper, not knowing whether it is right or wrong.

Figure 4.4: Fill-in-box for typing and the DILP list of concepts and keywords



In an activity about understanding the range of digital information, the DILP should reinforce the importance that a range of digital information sources are needed and available to successfully complete an assignment.

The main difference between the ILP and the DILP is the format in which the information sources will be made available to the student, for example online catalogues as opposed to card catalogues, full-text databases as opposed to

bibliographic databases, electronic books as opposed to printed paper formats and various Web sites, *etcetera*.

These activities of orientation are important as the students from Generation Y lack critical-thinking skills (discussed in Chapter 2, section 2.3.11). By focusing their attention on the completion of these activities, critical-thinking skills can be enhanced.

Another difference between the ILP and the DILP is that the orientation activities take place in a digital environment. Just as the orientation activities require a computer and Internet connection to be carried out in a DILP, the interaction activities also require a computer and Internet connection. The interaction activities will now be discussed.

4.2.2 Interaction

''Interaction'' is the continuous transfer of information in both directions between information sources and the person using it (Oxford advanced learner's dictionary of current English, 1995a:621).

For a DILP, the transfer of information will take place between the digital information sources such as databases, and the person using it, in other words the student from Generation Y.

The interaction between the digital information source and the student is described in Table 4.1.

Table 4.1: Interaction activities

Activity	Explanation of activity
To choose from a range of appropriate digital information sources to fulfill different digital information needs.	• Choose from electronic books, electronic journals, electronic encyclopaedias, full-text databases, World Wide Web sources, *etcetera.* • Choose between subject specific and general digital information sources.
To determine keywords, synonyms, *etcetera* to search the digital information sources.	• Constructing search strategies using keywords, synonyms, Boolean logic, wild cards, *etcetera,* where appropriate. • Formulate search strategies appropriate for databases available *via* the Web. • Knowledge about the operations of Web search tools such as search engines.
To select, locate and access digital information.	• Select the appropriate digital information sources after locating them *via* network databases, the Web. • When selecting information which fulfils the digital information need, the student needs to retrieve the relevant information from its source. • Retrieve the digital information physically, for example

Activity	Explanation of activity
	downloading a file with information onto the computer or accessing an electronic dictionary. • Access the digital information by opening the computer files and reading the digital information.
To quote and cite others' work correctly.	• Use a digital citation and bibliographic reference guide for quoting and citing digital information. • Complete a list of the digital information sources used, by compiling a bibliography.
To know about and adhere to copyright and avoid plagiarism.	• Understand copyright, for example not to download digital information and save it in an electronic format. • Avoid plagiarism by citing and quoting the digital information sources, and not to simply cut and paste digital information.
To be aware of issues such as currency, bias and authority (De Jager & Nassimbeni, 2002a:4).	• Understand the issues, for example the student should ask himself/herself questions about when the digital information was published – therefore understanding currency. • For further assistance in the evaluation of Web sources, the students should be able to

Activity	Explanation of activity
	hyperlink from the DILP to Web sites such as the **Librarian's index to the Internet** and the **Internet Scout Project** for the evaluation of quality Web sites. • Students should also be able to select relevant information from the vast amount of information available *via* the Web.

It is clear from the above description that the DILP differs from the ILP in the following ways:

- The continuous transfer of information takes place *via* computers.
- The information sources are electronic sources and digital by nature.

In Chapter 2, section 2.2.4., it is pointed out that Generation Y prefers action to observation. Interaction between the student and the digital information sources is therefore imperative. As these students are motivated by technology (Chapter 2, section 2.3.3) they should master the digital information literacy skills easily, since they are used to computers.

4.2.3 Internalisation

The term internalisation is described in Chapter 3, section 3.2.3. It was established that the student must make the information part of himself/herself by absorbing the information through repeated exposure. Internalisation should take place in the DILP when certain activities are provided that will assist the student

in absorbing the information through repetition. These activities are illustrated in Figure 4.5 and then briefly discussed.

Figure 4.5: Internalisation activities

To compare and evaluate digital information

Once the student has found a range of digital information sources, he/she must judge what is relevant and useful information and what is not. This is done by using the following criteria:

- Relevance (Is the information comprehensive enough to meet the requirements set by the assignment?)
- Timeliness (Is the information current or too dated for the requirements set by the assignment?)
- Reliability (Has the information been obtained from an authoritative source?)
- Coverage (Do the information sources cover the content required to complete the assignment? In order to determine this, the student should browse through the overview or summary of the document)
- Accuracy (Are all the facts well documented or footnoted?).

To organise and use digital information

The student should organise and use the digital information that he/she has retrieved by completing, for example, an assignment. This will help him/her to understand and analyse the digital information.

The DILP should therefore

- show the student the layout of an assignment/research project (the layout can be the title, main and subheadings of an assignment, *etcetera).*
- help the student to create an outline of topic headings and subheadings.

To produce, present and communicate an organised piece of work.

The student should prepare an organised piece of work, for example an assignment. The DILP should assist students in the following ways to complete the internalisation activity:

- Show the student how to write an assignment/research project by, for example, providing a document on assignment writing.
- Provide templates to follow or adapt.
- Show the student how to communicate the digital information by, for example, using e-mail, bulletin boards, online discussion groups, *etcetera.*

To ensure synthesising

Synthesising is the process of integrating the gathered digital materials and creating one's own digital information product. This is achieved when the previous activity of producing, presenting and communicating an organised piece of work is completed and the work is assessed. The DILP should ensure that assessment takes place (as discussed in section 4.3.5. of this chapter).

It is important to take **internalisation** into consideration when designing and developing the DILP for Generation Y. These students are active learners (Ference & Vockell, 1994:25) and will appreciate the fact that they can be active in producing and presenting, for example, a piece of work such as an assignment – as explained in Chapter 3, section 3.2.3.

It is also pointed out in Chapter 2, section 2.3.11 and Chapter 3, section 3.2.3 that Generation Y lacks critical-thinking skills. When information from different digital information sources is compared and evaluated by using certain criteria, such as timeliness, authority and bias, critical-thinking takes place and critical-thinking skills are developed (Grafstein, 2002). Internalisation will therefore assist in the development of these critical-thinking skills.

As the characteristics of an ILP were identified, it is also necessary to establish the characteristics of a model DILP, to ensure best practices.

4.3 Characteristics of a model DILP

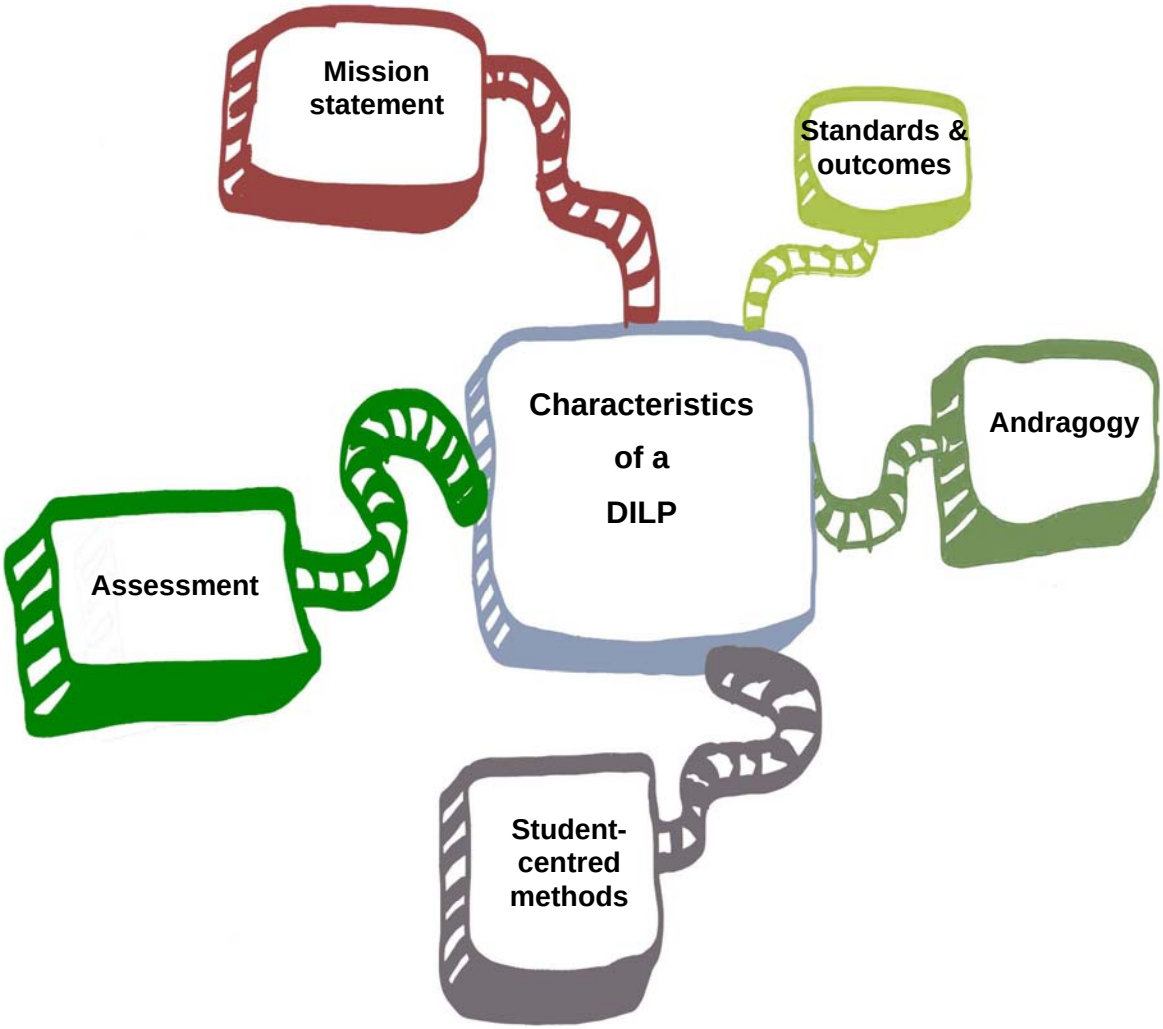
In Chapter 3, section 3.3, the following characteristics were identified for a model ILP:

- Mission statement
- Goals and objectives
- Andragogy and student-centred learning
- Assessment.

These characteristics should also be applied to the DILP. The goals and objectives will, however, be changed to standards and outcomes. The explanation for this is given in section 4.3.2 Standards and outcomes.

The characteristics are illustrated in Figure 4.6 and are discussed in the sub-sections.

Figure 4.6: Characteristics of a DILP



4.3.1 Mission statement

The mission statement describes the overall purpose of the program, with the anticipated contributions, benefits and a definition. The mission statement for a DILP includes the following:

Mission:

The Digital Information Literacy Program at the University should develop, in partnership with the various departments and faculties, digital information literate students.

Definition:

Digital information literacy is the ability to understand and use digital information in multiple formats from a wide range of sources when presented *via* a computer.

The mission statement should be incorporated into an introductory page of the DILP – explaining to the students what digital information literacy is.

4.3.2 Standards and outcomes

As seen in Chapter 3, Section 3.3.2., goals and objectives are important for an ILP as they reflect what the student should learn during the use of the programme. According to Gibson (2003:171), the setting of goals and objectives is one of the key steps in designing a program. The focus of goals and objectives of a model DILP is different from that of an ILP because it is Web based.

The enriching Web based environment has changed the goals and objectives from skills development in the ILP, to critical-thinking and problem-solving abilities in the DILP. The goals and objectives are now based on a more holistic approach (Gibson, 2003:178).

Chapter 2, section 2.5.4. points out that the holistic approach will suit Generation Y, as it provides a broader vision of human development.

In order to change to a holistic approach which makes provision for critical-thinking and problem-solving abilities, the goals are replaced by **standards** and the objectives by **outcomes** (Gibson, 2003:181).

A **standard,** according to Mothata (2000:165), is a statement of desired outcomes and an **outcome** is a specific method by which a student can demonstrate skills.

In 2000, the ACRL produced the ''Information literacy competency standards for higher education'' and CAUL (Council of Australian University Librarians) published the ''Information literacy standards'' in 2001. These standards are, however, only applicable to a **person** and not a **program**.

These standards were therefore adapted while writing the standards and outcomes for the DILP and are tabulated in Table 4.2.

Table 4.2: Standards and outcomes for a DILP

Standard	Outcomes
Standard 1: The program will assist the student in recognising the need for digital information and determining the nature and extent of the digital information need.	**Outcomes:** The student can • understand the need for digital information. • when given a topic, define and refine the topic. • identify key concepts and terms. • explore general digital information sources to increase familiarity with the topic.
Standard 2:	**Outcomes:**

Standard	Outcomes
The program assists the student in searching and accessing the needed digital information effectively and efficiently	The student can • select the most appropriate digital information sources for finding the needed digital information. • select the most appropriate digital information access tools for finding digital information. • construct and carry out an effective digital search strategy. • retrieve digital information in a variety of formats.
Standard 3: The program aids the student in evaluating the digital information and its sources.	**Outcomes:** The student can • evaluate the quality of a digital source using multiple criteria, including authority, currency, content and reviews.
Standard 4: The program shows the student how to store and manipulate the digital information and describes various digital information formats	**Outcomes:** The student can • recognise various digital information formats. • capture the digital information. • create a system for organising the digital information. • take precautions to avoid the spreading computer viruses.
Standard 5:	**Outcomes:**

Standard	Outcomes
The program shows the student how to create new knowledge by integrating digital information.	The student can • organise digital information. • synthesise the digital information found.
Standard 6: The program aids the student in understanding the economic and legal issues surrounding the use of digital information and in using the digital information ethically.	**Outcomes:** The student can • understand free *versus* fee-based digital access to information. • understand plagiarism and copyright and the implications thereof. • use a citation and bibliographic reference style.
Standard 7: The program helps the student in recognising that lifelong learning requires digital information literacy.	**Outcomes:** The student can • seek to maintain current awareness. • keep up to date with digital information sources and technologies.

4.3.3 Andragogy

In Chapter 3, section 3.3.3 andragogy is explained as the education and teaching of adults. Dewald (2003:47) further explains that the teaching of adults focuses on student-centred methods. As students from Generation Y are regarded as adults, the DILP should focus on student-centred methods.

4.3.4 Student-centred methods

According to Dewald (2003:54-59), these methods include the following:

- Asynchronous communication
- Co-operation among students
- Active learning techniques
- Prompt feedback
- Technologies to complete tasks
- Cognitive skills development
- Flexible structure of program.

In Table 4.3 the above-mentioned methods are explained and applied to the Generation Y characteristics, demographics, learning style preferences and expectations.

Table 4.3: Student-centred methods in a DILP

Student-centred methods	Explanation	Generation Y characteristics , demographics, learning style preferences and expectations
Asynchronous communication	• Increased communication using, for example, e-mail and online discussions • Helps students who need personal connections for more effective learning • Assignments can be sent to the librarian for review and can be returned to the student	• Connectivity • Interaction • Technology as motivation
Co-operation among students	• DILP should be used in pairs - students should help each other with assignments and quizzes which are included in the program – or small groups helping each other (Dewald, 2003:56) • Sharing of ideas and team effort result in effective learning (Chickering & Gamson, 1987)	• Peer learning • Teamwork
Active learning techniques	• Interactivity – students are actively involved with the DILP (Dewald, 2003:56), for example a problem is presented: how to search	• Active learning

Student-centred methods	Explanation	Generation Y characteristics , demographics, learning style preferences and expectations
	for digital information on a full-text database • Learning by doing, for example to physically search for an article on a full-text database	
Prompt feedback	• Students need feedback to know what they have learned from the DILP • Feedback should be provided, for example, by using e-mail, quizzes and activities that test knowledge with immediate responses	• Technology as motivation • Expectation to receive immediate constructive feedback
Technologies to complete tasks	• Technology entices students and keep their interest – the DILP should therefore assist them in completing tasks (Dewald, 2003:58) • Tasks are based on a digital information need that the student already has, or a few choices for topics within the program are given. The DILP, for example, should give the	• Technology as motivation • Connectivity

Student-centred methods	Explanation	Generation Y characteristics , demographics, learning style preferences and expectations
	students an assignment to search the OPAC for information on certain subjects. The student will choose a subject of interest to him/her and then conduct the search.	
Cognitive skills development	• The DILP, for example, should present criteria to evaluate Web sites. Students are given Web sites to evaluate using these criteria - therefore addressing the analysis, application and evaluation of cognitive skills	• Critical-thinking skills
Flexible structure of program	• The DILP should have a menu bar which is always visible, allowing the students to choose where they want to go, thus creating a flexible structure.	• Choice in products • Non-linear interaction with information

4.3.5 Assessment

Assessment is aimed at measuring the student's learning abilities (Jacobson, 2003:147) and should be connected to the outcomes as tabulated in Table 4.2.

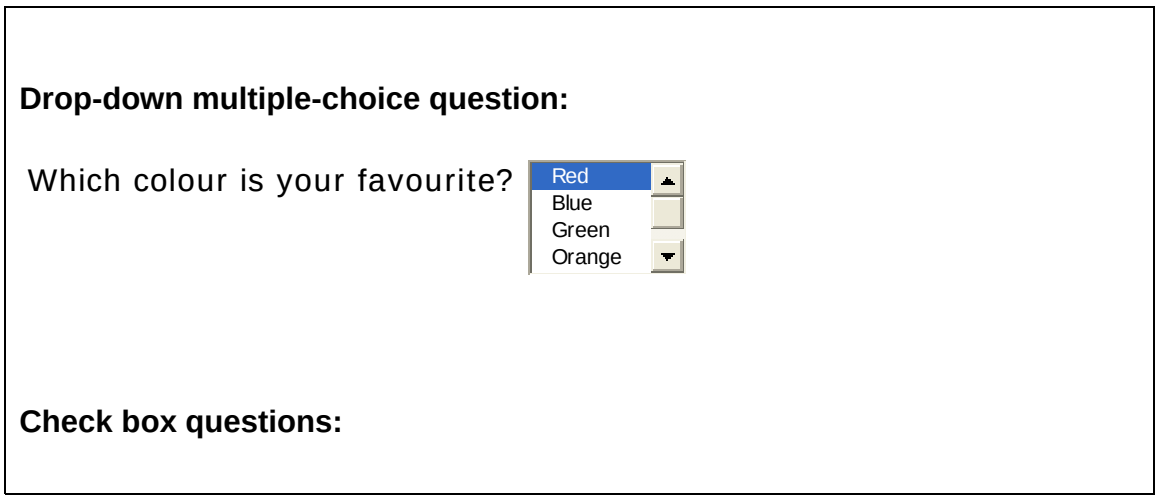
Chapter 3, section 3.3.5 gives examples of traditional assessment, for example quizzes, oral defense and essays. Since the DILP is designed in a Web based environment, the program should make use of Web based assessment and not the traditional paper-based formats.

Jacobson (2003:148) suggests that a variety of methods should be used.

One of the methods is performance assessment. The ACRL (2005b) states that student outcomes should be evaluated by focusing on student performance and knowledge acquisition. One way of conducting performance assessment is by teaching students the concepts and skills related to online database searching. The students would select an appropriate database, conduct a search, select the digital information from the results and e-mail all this to the librarian.

Selected response is another assessment tool. This involves multiple-choice and true/false questions. The question is posed and the student can select the answer, either from a drop-down list or a check box – by clicking in the appropriate box. Figure 4.7 illustrates the drop-down multiple-choice question and the check box question.

Figure 4.7: Drop-down multiple-choice and check box questions



Which of the following are full-text databases? (Choose all that apply).

- ☐ A. EBSCO
- ☐ B. Emerald
- ☐ C. ScienceDirect
- ☐ D. ERIC
- ☐ E. Magnet

The OPAC is available only through the electronic resources portal.

- ◉ A. True
- ○ B. False

Cognitive assessment takes the form of open-ended questions – allowing typed responses. To assess open-ended questions, a list of desired keywords is used and the response can be compared to the list of keywords.

Figure 4.8. illustrates cognitive assessment.

Figure 4.8: Open-ended questions

Studies of Internet users have concluded that spending too much time online can adversely affect a person's psychological wellbeing.

List all the main ideas related to the topic above in the box provided.

Then press "process it!"

“process it’’

Your list and ours had these same terms:

Here's our complete list:

studies
study
Internet
users
online
wellbeing
surveys
addiction

The completion of the above-mentioned activity should not take more than two or three minutes (Samson, 2000) and should be posed at the end of each unit. This will address the fact that Generation Y feels that they are crunched for time, in other words they have too little time to complete things. As the students do not need to pay attention for an extended period of time, this also addresses the

short attention span of Generation Y and prevents boredom – as mentioned in Chapter 2, section 2.3.5 and section 2.3.6

Jacobson (2003:161) suggests another method of assessment, namely portfolio assessment – called a Webliography in the DILP. This is a collection of the student's work, based on the outcomes stated for the units. After completion of all the units, the student will be asked to complete a portfolio based on a topic of his/her choice.

An example of the above-mentioned is where the student must

- provide a selection of digital sources (from the Web, online library catalogues and databases).
- compile a search strategy.
- provide the search results.
- compile a bibliography of the selected digital sources.
- keep record of the digital sources (saved on a stiffy or in folders).

After compiling the portfolio, the student will e-mail it to the librarian for assessment. This assessment method might cause some problems for the already busy librarian, as it will require extra time to work through the students' portfolios, to do the actual assessments.

4.4 Presentation of the DILP

Traditionally, the ILP has been presented using various paper-based and electronic formats and methods, as seen in Chapter 3, section 3.4.

As the usage of the Web has increased significantly over the last years, students are eager to utilise this medium to access digital material and information. Librarians are also enthusiastic about using the Web to reach students for

instructional purposes (Germain & Bobish, 2002:72) and provide them with digital Web based materials.

The format of the DILP should therefore be an online interactive Web based tutorial.

This format is used in conjunction with the following methods of delivery:

- Instruction provided by a librarian (Jacobson, 2003:158). The librarian will introduce the DILP and the students will then follow the DILP on their own. The process will be followed up, using e-mail. This will ensure that some kind of personal connection is made between the students and the librarian, as students from Generation Y have a need for mentors (Chapter 2, section 2.3.8)
- Individual use by students, where they access the DILP *via* the Web, from home, campus or Internet café. As there is an absence of a traditional classroom instructor, the program will offer a chat room for students to talk with peers (Dupuis, 2003:166) – when offered through WebCT. This will suit the characteristic of interaction with peers, which Generation Y prefers (refer to Chapter 2, section 2.3.7.)
- A formal classroom setting, where the librarian follows the digital information literacy program online with the students using an instructor's workstation, projector and networked computers. The reason for this method of delivery is explained in Chapter 2, section 2.3.8. Generation Y is not always independent and therefore has a need for mentors. As a result of this, they want the person in charge to be accountable for training
- Courseware packages (for example WebCT and Blackboard) will enhance digital information literacy as course Web sites can be created and assignments and communications can be distributed.

All of the above-mentioned methods will ensure scaleability, meaning that it could be delivered to a large number of students (Donnelly, 1998:147).

These **formats** and **methods** are all suitable for Generation Y because

- students from Generation Y prefer connectivity through using the Web. (Chapter 2, section 2.2.3 Connectivity).
- active learning, also preferred by Generation Y, is supported by the formats and methods, since participation and reporting back to a group, for instance, takes place (Chapter 2, section 2.2.4 Interaction). The students need to get access to computers (Barclay, 2003:150) to facilitate active learning.
- Peer learning and teamwork are encouraged as Generation Y prefers teamwork with peers to complete an assignment (Chapter 2, section 2.3.7 Peer learning and 2.3.13 Teamwork).
- the non-linear interaction with information is preferred by Generation Y, (Chapter 2, section 2.3.14 Non-linear interaction with information). They are used to information presented in a non-linear fashion such as the Web and television.

4.5 Summary

This chapter dealt with the **criteria** for a model DILP, the **characteristics** of a model DILP and ways in which the DILP should be **presented.** The implications of these for Generation Y were also discussed.

It was important to deal with the above-mentioned, as it was mentioned in Chapter 1, section 1.2.1 that no criteria, characteristics and presentation of a DILP existed prior to this study.

The design of the DILP is discussed in Chapter 5.

Chapter 5

The design of the DILP

5.1 Introduction

It was stated in Chapter 4, section 4.4 that the usage of the Web has increased significantly over the last ten years and that students are eager to utilise this medium to access material and information for their assignments.

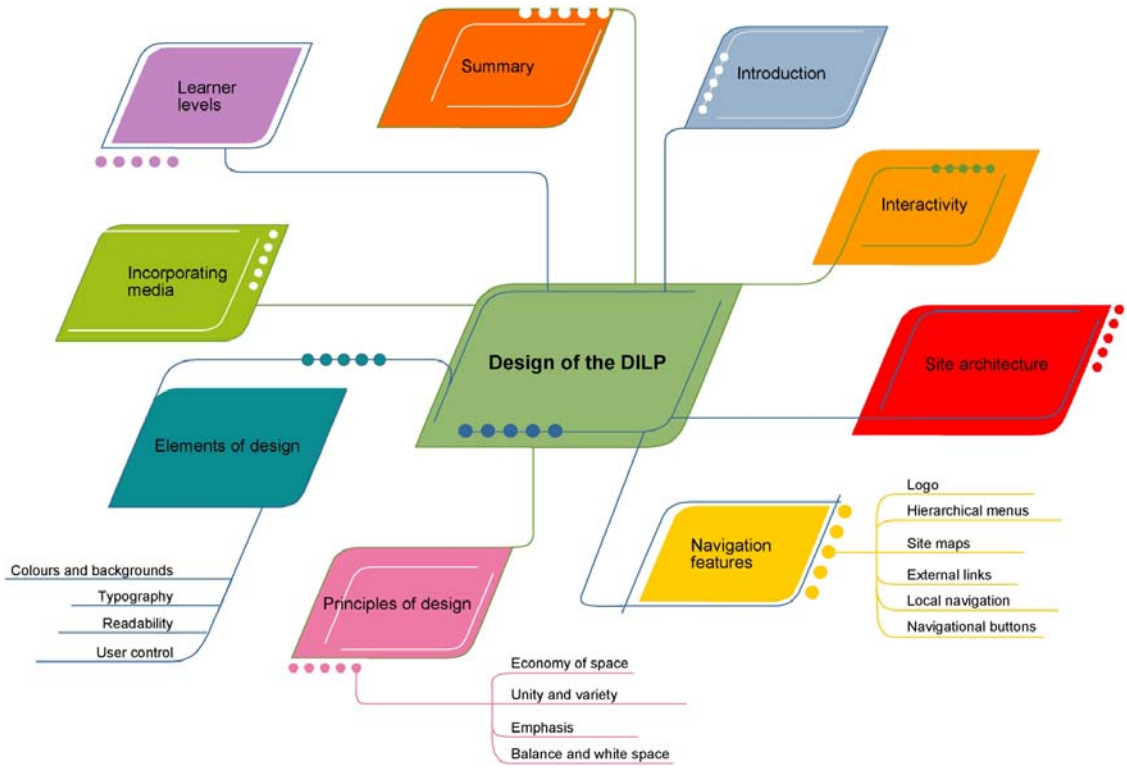
The design of the DILP therefore took place in the Web environment. When comparing the view of Germain and Bobish (2002:73) to that of Gibson (2003:177), it is clear that, in this environment, new interactive online tutorials and instruction materials can be created, taking advantage of the Web technology.

Since a Web environment was used for the design of the DILP, certain factors relating to Web design are discussed in this chapter. These are identified as **significant** factors by Sharpless Smith (2003:191-208), O'Hanlon (2003:225-233) and Glenn (2003:241-254) and include the following:

- Interactivity
- Site architecture
- Navigation features
- Principles of design
- Elements of design
- Incorporating media
- Learner levels.

These factors and the components flowing from them, which are discussed in this chapter, are illustrated in the following figure.

Figure 5.1: Mind map to illustrate chapter content



Each of these factors will be described in more detail in this chapter.

5.2 Interactivity

According to Sharpless Smith (2003:191), interactivity can be defined as a dialogue between a human and a computer program where the program responds to input by the human. Applied to the DILP, the dialogue takes place

between the student and the program. This is important as it is pointed out in Chapter 4, section 4.2.2 that interaction is one of the steps in a **model** DILP.

Interactivity can only be experienced when the students are able to provide input, explore, make decisions and receive feedback (Sharpless Smith, 2003:192).

As a Web environment lends itself to interactivity, the following were used to ensure interactivity:

- Questions, quizzes (such as multiple-choice) and self-tests with immediate feedback, using forms. A question, for example, is posed to the student, a fill-in-box is provided to type and submit the answer and the correct answer is displayed.
- Graphics and animations which aid in visual cognition, interest and interactivity (Hegarty, Quinlan & Lynch, 2004).
- Real-time database searches.
- Simulations, to present real-world environments, for example an instruction to the student to assist a peer with an assignment.

Interactivity addresses the following demographics, characteristics and learning style preferences of Generation Y, as discussed in Chapter 2:

- Section 2.2.3 Connectivity: students are connected to the Web and are therefore interactive.
- Section 2.2.4 Interaction: students have interaction with the DILP and the digital information sources.
- Section 2.3.1 Visual orientation: visual objects stimulate the students, ensuring better understanding of the content.
- Section 2.4 Learning characteristics, for example active students and hands-on learning: the connection to live resources will ensure that the

students are active, having hands-on experiences while searching live on databases.

- Section 2.5.2 Kinaesthetic learning style: students move from a set of instructions in the DILP to a digital information source and conduct a search; therefore by moving and handling the digital information sources, learning is increased.

Interactivity therefore allows the students to actively participate in learning.

5.3 Site architecture

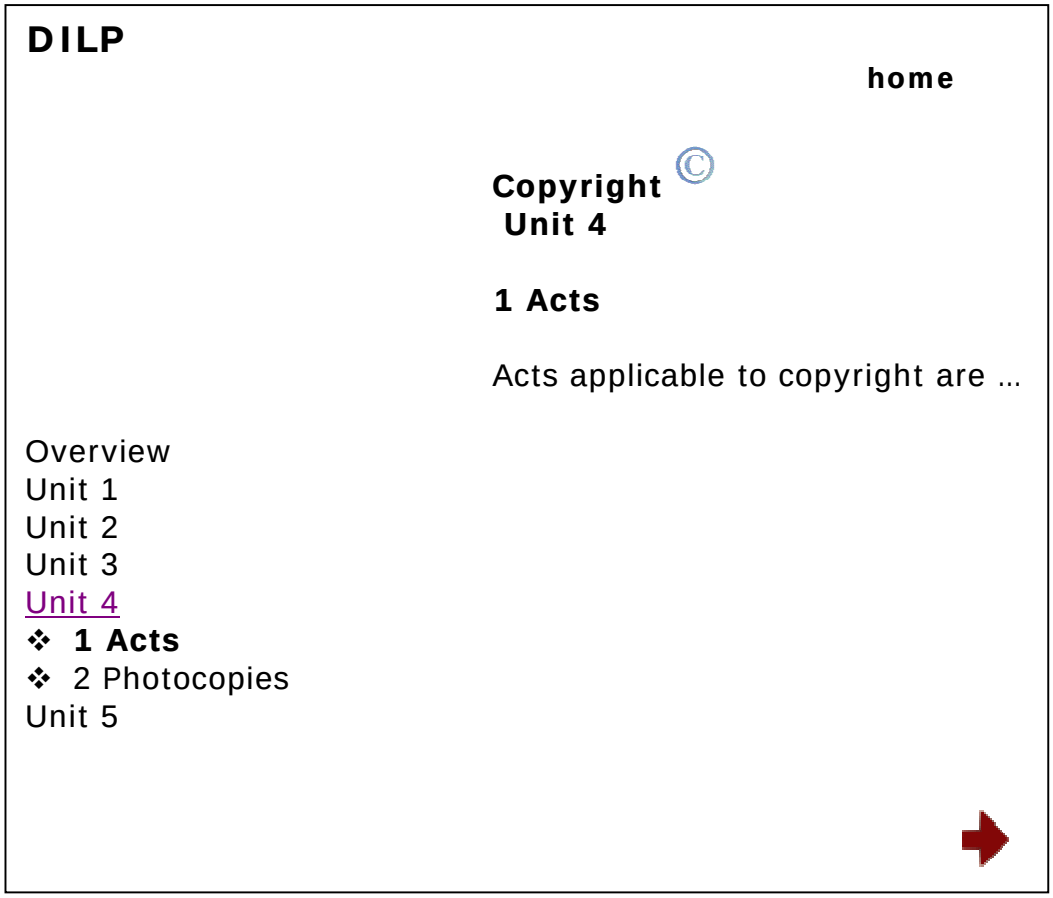
Site architecture is the structure of an instructional Web site (O'Hanlon, 2003:226), in other words the way the units are connected and arranged. One type of site architecture is the **flexible path** structure.

The flexible path structure implies that the student can view the content in any order or sequence (O'Hanlon, 2003:227), depending on his/her choice. The units are available from the home page and other parts of the site. The student can work through it systematically or skip sections and go directly to the units he/she sees as relevant, therefore controlling his/her learning environment.

Figure 5.2 illustrates the flexible approach.

The left-hand has a navigation panel, which provides access to all the sections of the units of the DILP. Outlines for the different units are also visible by showing a second level of detail. The student can jump out of the program, by using the navigation links such as the home button (**home**) at the top of the page, or to the next unit or page by using the next link () at the bottom of the page.

Figure 5.2: Flexible site architecture



The flexible approach was chosen because it is most suitable for adult learners (O'Hanlon, 2003:227). In Chapter 3, section 3.3.3 Andragogy, it is pointed out that students from Generation Y are mostly adults.

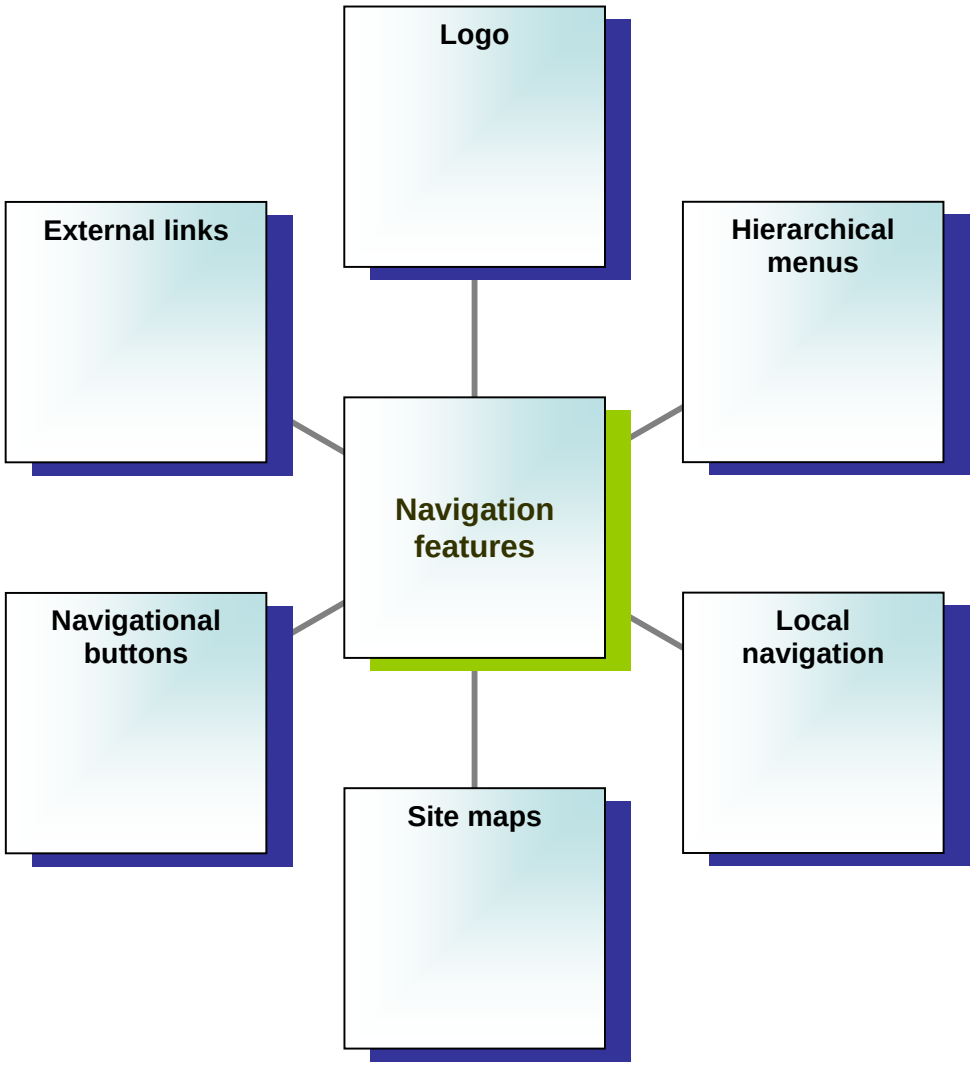
The fact that the student can choose which unit to visit suits the characteristic of preferring a **choice in products** of Generation Y, as described in Chapter 2, section 2.3.4. Choice in products. It also suits Generation Y's ability to interact with information in a non-linear way (Chapter 2, section 2.3.14 Non-linear interaction with information) – as the student can skip sections and go directly to the units he/she sees as relevant. The student does not need to go from page to page (linear interaction).

5.4 Navigation features

Navigation was used to help the student understand his/her current location (Nielsen, 2004). Navigation also provides the student with hints about where he/she has been and where he/she can go. Certain features must appear in the same location of every unit of the DILP to form a global navigation system (O'Hanlon, 2003:229).

The following figure shows the navigation features that form part of the global navigation system for a DILP:

Figure 5.3: Navigation features



5.4.1 Logo

A logo was designed for the DILP (see Figure 5.4). The purpose of the logo is to make the DILP recognisable. The logo was placed on all the pages of the various units of the DILP. The logo always appears in the upper left corner, as people tend to read the English language from left to right (Nielsen, as quoted by O'Hanlon, 2003:229).

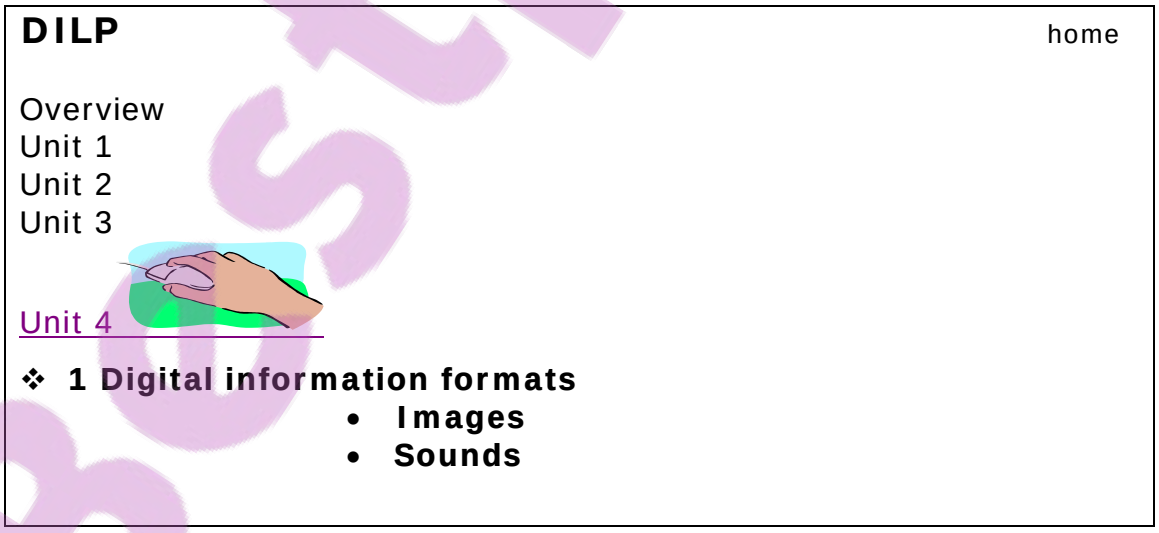
Figure 5.4: Logo for the DILP

5.4.2 Hierarchical menus

TheFreeDictionary (2004c) defines a hierarchical menu as a secondary menu that appears while the user holds the cursor over an item on the primary menu. More text is given when the student clicks on the image or piece of text.

Figure 5.5 illustrates the secondary menu. A part of Unit 4 is expanded when the mouse pointer is clicked on the text **Digital information formats.** It expands to **Images and Sounds.**

Figure 5.5: Hierarchical menus



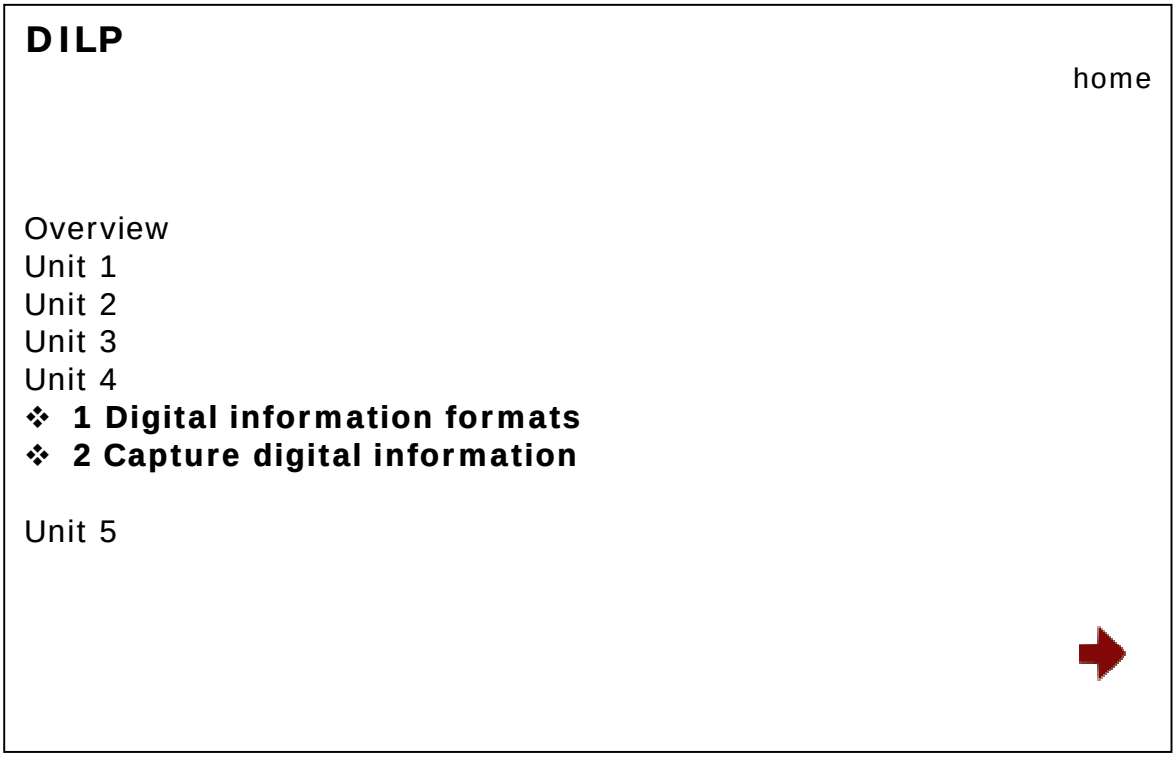
5.4.3 Local navigation

Local navigation devices are forward and backward arrows, or next and previous links (O'Hanlon, 2003:232). These devices were used consistently as they are always at the top and bottom of every page. This ensures that the student does not have to look around to navigate.

The DILP uses arrows at the bottom, showing the user to go to the next page.

Figure 5.6 illustrates local navigation with the arrow at the bottom, indicating the next page.

Figure 5.6: Local navigation



5.4.4 Site maps

Site maps, according to O'Hanlon (2003:232), can be a text listing of **all** the pages of a site in a hierarchical or graphical way, depicting the content.

The site map for the DILP is a list of all the units in the DILP. Figure 5.7 illustrates the site map for the program – listing all the units as well as some of the sections of some of the units.

Figure 5.7: Site map of the DILP

DILP

home

Unit no.

1 Defining your topic
- Understand the need for information
- Define your topic
- Refine your topic

2 Searching for digital information
- Selecting digital information sources
- Digital information access tools
- Constructing an effective digital search strategy

3 Evaluating digital information

4 Obtaining and managing digital information

5 Organising your digital information

5.4.5 Navigational buttons

According to Jacobs (2002:33), navigational buttons are hyperlinks to guide students to other pages of the site. Hyperlinks can be in the form of images or text. The DILP used text, which is blue in colour.

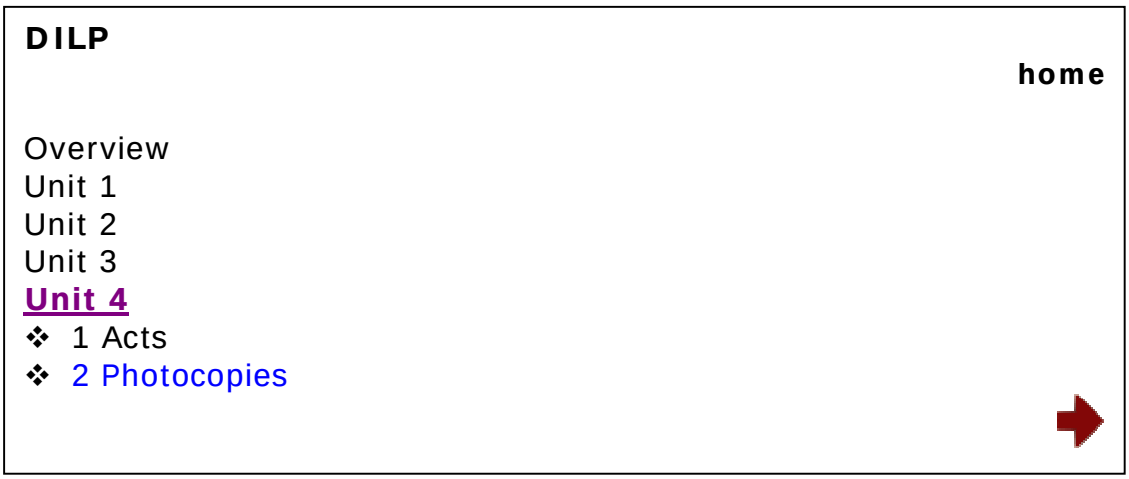
The colour changes when the hyperlink has been visited. This enhances navigation, as students will not revisit the same pages unless they wish to.

Hyperlinks should be visible and clear, but also limited to five per page (Jacobs, 2002:38) as students can lose their way in the DILP. If every word is a hyperlink, the main ideas will disappear.

Apart from the text hyperlinks, buttons were also added in navigation bars to assist in the navigation.

Figure 5.8 illustrates the hyperlinks under Unit 4. Unit 4 has been visited, therefore the purple text. **Photocopies** is in blue, indicating to the student that by clicking on that word he/she can visit another page. The word **home** at the top is also a navigational button.

Figure 5.8: Navigational buttons



5.4.6 External links

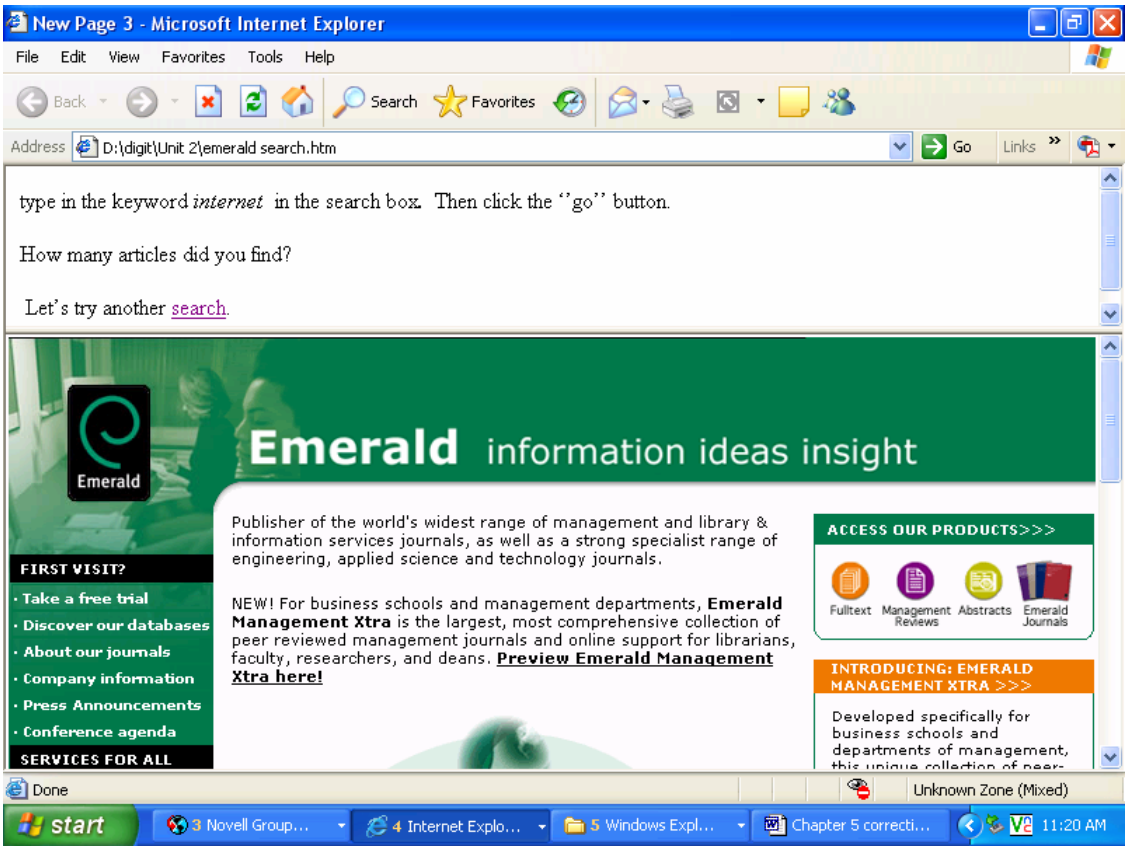
Students are able to link from the DILP to databases to practice their searching skills, therefore making use of an external link. To prevent the student from losing track, navigational support is given by dividing the page in two frames; one containing the instructions, the other opening the external link, for example the database search pages.

Care was taken not to create too many possible links to external World Wide Web sites, as Uniform Resource Locators (URLs) change often and the content of pages do not remain constant (Germain & Bobish, 2002:80).

Figure 5.9 illustrates the external link by instructing the student to click on **here** to link to the external database. Figure 5.10 shows what it looks like on a page where instructions and access to a database are given.

Figure 5.9: External link

Figure 5.10: External link: database page



To further enhance the navigation scheme throughout the DILP, the overall design of the different units should comply with the principles and elements of design. These will be discussed in the following sections.

5.5 Principles of design

Glenn (2003:244-248) highlights various principles, namely:

- Economy of space
- Unity and variety
- Emphasis
- Balance and white space.

5.5.1 Economy of space

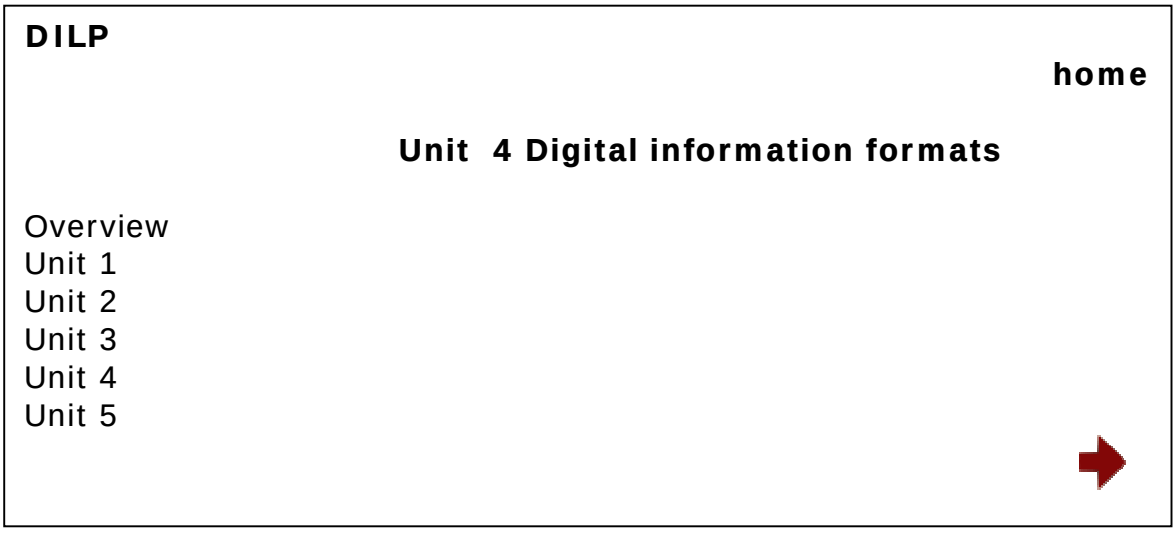
As the browser window, in which the unit's information appears, has limited space, one should only include the type and quantity of information that is most valuable to the student. The number of elements should not be overwhelming.

The elements were placed consistently for the students to detect the pattern easily. The title, for example, always appears in the centre, navigation buttons at the top right and bottom right and content on the left.

More or less seven elements were placed on each page, as Glenn (2003:244) states that there is a limit to the amount of information a student can process.

Figure 5.11 demonstrates the simplicity (more or less seven elements) and the consistent use of elements (title in the centre and navigation buttons top right and bottom right).

Figure 5.11: Simplicity and consistency



5.5.2 Unity and variety

According to Morris (1999a), everything should fit together as a recognisable unit with enough variety to keep it interesting. Any page of the DILP should look as if it is part of the whole DILP and not as if it forms part of another program. This means that the pages of the DILP need to be consistent. This can be achieved, for instance, by placing the logo consistently in the same place throughout the DILP.

When using colours, typography, backgrounds, *etcetera* consistently, unity is also achieved. These are discussed in section 5.6.

5.5.3 Emphasis

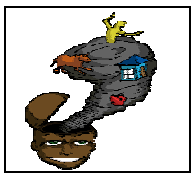
When a person opens a page, the natural reaction is to read from left to right. The DILP is designed to start navigation from the left side, where the logo appears, followed by access to the units and their content. This is illustrated in Figure 5.12.

Figure 5.12: Emphasis

To place emphasis on something, headings and graphics are used as they are methods to attract attention. Graphics are fairly small, as graphics do not have to be big to draw attention. These are also illustrated in Figure 5.13.

Graphics were only used to illustrate difficult concepts. To illustrate brainstorming, for instance, Figure 5.13 was used.

Figure 5.13: Example of a graphic used in the DILP



(University of Texas System Digital Library, 2004)

As graphics can take a lot of time to download – resulting in frustration on the student's part – GIF (Graphic Interchange Format) and JPEG (*Joint Photographic Experts Group)* files were used. These file formats reduce a file's size making it faster to download (Shelly, Cashman & Vermaat, 2001:I.10).

5.5.4 Balance and white space

According to Glenn (2003:248), balance and white space go hand in hand. There should be enough white space on the pages of the DILP, as too little white space creates tension and anxiety on the part of the viewer.

Apart from the importance of the principles of design, this chapter also focuses on the elements of design.

5.6 Elements of design

The following elements of design are discussed:

- Colours and backgrounds
- Typography
- Readability
- User control
- Map or table of content.

5.6.1 Colours and backgrounds

Certain colours and backgrounds were used consistently throughout the program. No bold and flashy colours were, however, used.

The colour **dark blue,** was used as it adds life to white pages and it is seen as an attractive and dignified colour. **Green** was added, as there should be more than one colour, but not more than three. The **green** and the **blue** are viewed as soft colours – unlike red and yellow which are considered hard colours (Morris, 1999b).

Web safe blue and green were chosen as they appear consistent on any computer monitor or Web browser. Each colour's hexadecimal value and the RGB (Red, Green, Blue) values are indicated in table the below.

Table 5.1: Hexadecimal value and RGB colour codes for colours used in the DILP

Green	Hexadecimal value - #339900	RGB colour code – R=51 G=153 B=0
Blue	Hexadecimal value - #003399	RGB colour code – R=0 G=51 B=153
Blue	Hexadecimal value - #66CCFF	RGB colour code – R=102 G=204 B=255

(Web-Source.net, 2005)

Black was used for headings on a white page, as it adds life to white pages.

Backgrounds are not too light, dark or marbled as it makes it difficult to read text and view graphics against such backgrounds. A white background was used as Morris (1999b) suggests that a light neutral colour should be chosen as background.

5.6.2 Typography

Font types should support the information and should be compatible with various software programs, as students have different fonts loaded on their computers.

The **sansserif Arial** was therefore used, as it is one of the easier fonts to read on-screen and it is not an uncommon typeface.

A 12-point type for body text was used. This makes the text more readable (Glenn, 2003:252).

Bold text was used to accentuate important text and *italics* were used for words or phrases which should be highlighted. Underlined text was used only to indicate hyperlinks.

The use of capital letters was limited as they restrict smooth reading. Capital letters were only used for the first word of each heading and for all proper nouns.

Only titles were centred. Body text was not centred, as it restricts the flow of reading between texts.

5.6.3 Readability

Readability was improved by using the following:

- Lists
- Prose
- Vocabulary
- Text length
- Page layout
- Columns
- Spelling.

The above-mentioned are explained in the following table.

Table 5.2: Improving readability

Ways	Explanation
Lists	• Lists help students to scan main points.
Prose	• Flowing prose was used. • Sections of text flow from one to the other to ensure convergence of the student's eyes.
Vocabulary	• Simple, natural language was used throughout. • Jargon was avoided, as this makes it difficult for students to comprehend the lesson.
Text length	• Text does not contain too many words, as it

Ways	Explanation
	makes it more difficult to read (it is more difficult to read from a computer screen than from paper). • Brevity was achieved by linking additional pages rather than bombarding students with heavy sections of text and too long sentences.
Layout	• A familiar layout was chosen for each page, for example the logo at the top, content in the middle and menus on the left.
Columns	• A column layout of each page, which divides the page into columns of main text and site navigation (Lynch & Horton, 2001:98), was used. • Columns divide pages. • When using columns, the student does not need to read lines which are too long.
Spelling	• No spelling mistakes were allowed in the text of the DILP since that would influence readability.
Bulleted lists	• Help to organise the information. • Draw attention to individual short phrases and assist the user in scanning main points. • Items belonging together should be on the same level (organised in a logical hierarchy), for example: • software • hardware o printer o scanner

5.6.4 User control

User control means that the students can choose **what** they want to view in the DILP, **when** they want to view it (Jacobs, 2002:38). User control is also supported by using a flexible path structure – the student can view the content in any order or sequence – as discussed in section 5.3 of this chapter.

Students can choose what they want to view, by providing them with

- an outline of the units.
- access to any unit from any page in the site.
- a site map.

Students can hyperlink between units. This allows the students to jump to the part of the DILP most useful for their purposes (Germain & Bobish, 2002:74). The DILP therefore supports user control by allowing the student to choose any unit and return to it when he/she wants to.

As the DILP can be made available through the Web, the student can view the program any time he/she wants to.

5.7 Incorporating media

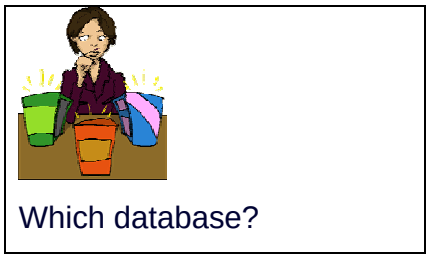
As multimedia can be incorporated in the Web environment (Glenn, 2003:253), and the DILP is designed in the Web environment, it makes it more interesting and inviting. The following multimedia was added:

- Graphics
- Sound
- Video

- Animation.

Colour graphics were used as they attract more attention than black and white graphics. The size of the objects are not too large, as it requires a lot of time to download and students will become impatient and lose interest. The following figure is an example of a colour graphic used in the unit on how to search databases.

Figure 5.14: Example of a colour graphic used in the DILP



(University of Texas System Digital Library, 2004)

Sound clips were, for instance, used. When the student opens the Plagiarism section in Unit 6, a jail sound can be heard. The sound files were kept small and was also limited to decrease downloading time (D'Angelo & Little, 1998:74).

Animation was used, for instance, on the loading page and in video clips containing instructions.

These objects should never be overwhelming; they should add some meaning and help the students to understand the message (Jacobs, 2002:38).

5.8 Learner levels

According to Hegarty, Quinlan & Lynch (2004), attention should be paid to the international best practice of instructional design, namely learner levels.

Learner levels allow the DILP to be basic enough to motivate the beginner, but also complex enough to stimulate the more advanced users (Hegarty, Quinlan & Lynch, 2004).

This implies the creation of different versions within different subject areas of the DILP. A variety in content and levels of difficulty should be presented to students with different learning experiences, catering also for a number of learning outcomes.

Although customising for various learner levels is entirely possible in the design and development of a DILP, a version catering only for students in the first to third-year level of tertiary education was designed. The reason for this is that the majority (60%) of students in South Africa fall into the first to third-year level of higher education (Department of Education, 2003).

A more complex version, for the more advanced student, may be considered as a topic for further research.

5.9 Summary

In order to design a quality DILP – one that is accessible, one with usable information and one that will attract students' attention (Jacobs, 2002:5) – it is important to follow design principles and best practices.

The design of the DILP therefore focused on a Web environment considering various factors, namely:

- Interactivity
- Site architecture
- Navigation features
- Principles of design

- Elements of design
- Incorporating media
- Learner levels.

The following chapter incorporates all the above-mentioned factors in the final development of the DILP. The content of the DILP is also described in the next chapter.

Chapter 6

The development of the DILP

6.1 Introduction

This chapter describes the **development** of the DILP, where the information from the previous chapters, especially Chapters 2, 4 and 5, is incorporated.

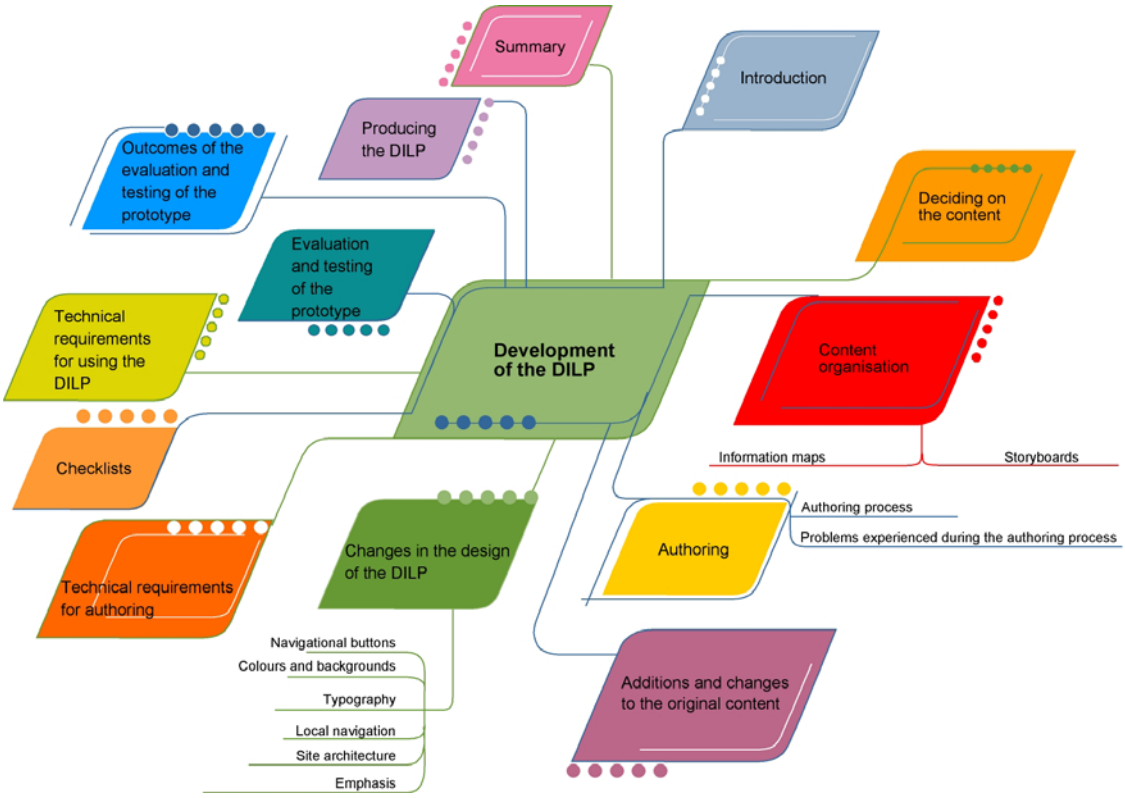
In Chapter 2 of this research, the characteristics, demographics and learning characteristics of students from Generation Y were discussed. The criteria and characteristics of a model DILP were established, as well as the presentation of a DILP in Chapter 4. In Chapter 5, the design criteria, principles and elements of design for a DILP were explained.

The DILP was developed by

- deciding on the content of the DILP.
- organising the content of the DILP (using information maps and storyboards).
- authoring.
- making changes to the original content.
- applying the elements of design.
- using checklists, to ensure that the guidelines and criteria established in the previous chapters were met.
- stating the technical requirements.
- evaluating and testing of the prototype.
- producing the DILP.

Screen captures from the DILP, tables and figures were used to illustrate certain parts of the development. The problems encountered, as well as motivations why certain aspects of the program were changed, are also discussed.

Figure 6.1: Mind map to illustrate chapter content



6.2 Deciding on the content

Lindsay (2004) states that the content of an online DILP should be grounded in information literacy standards. These standards were discussed in section 4.3.2 of Chapter 4.

The first standard, for example, deals with recognising the need for digital information and determining the nature and extent of the digital information required to complete a specific task.

The content of Unit 1 of the DILP therefore had to relate to the standard and had to include the recognition of the need for digital information and how to determine the nature and extent of the required digital information. Exercises, activities and quizzes in the unit are based on achieving the outcomes of the unit.

All the standards, outcomes and titles of the various units of the DILP are tabulated in Table 6.1.

Table 6.1: Standards, outcomes and titles of the units of the DILP

Standard	Outcomes	Unit number and title
Standard 1: The program assists the student in recognising the need for digital information and determining the nature and extent of the digital information required.	**Outcomes:** The student can • understand the need to find and use digital information. • define a topic. • refine the topic. • explore general digital information sources.	**Unit 1** **Defining your topic**
Standard 2: The program assists the student in accessing and searching the required digital information effectively and efficiently.	**Outcomes:** The student can • select the most appropriate digital information sources for finding the required digital information. • select the most appropriate digital	**Unit 2** **Searching for digital information**

Standard	Outcomes	Unit number and title
	information access tools for finding digital information. • construct and carry out an effective digital search strategy. • retrieve digital information in a variety of formats.	
Standard 3: The program aids the student in evaluating the digital information and its sources.	**Outcomes:** The student can • evaluate the quality of a digital information source using multiple criteria, including authority, currency, content and reviews.	**Unit 3** **Evaluating digital information**
Standard 4: The program shows the student how to store and manipulate the digital information and describes various digital information formats.	**Outcomes:** The student can • recognise various digital information formats. • capture the digital information. • create a system for organising the digital information. • take precautions to avoid the spreading of computer viruses.	**Unit 4** **Obtaining and managing your digital information**
Standard 5: The program shows the student	**Outcomes:** The student can	**Unit 5** **Organising**

Standard	Outcomes	Unit number and title
how to create new knowledge by integrating digital information.	• organise digital information. • synthesise the digital information found.	**your digital information**
Standard 6: The program aids the student in understanding the economic and legal issues surrounding the use of digital information and in using the digital information ethically.	**Outcomes:** The student can • understand free *versus* fee-based digital access to information. • understand plagiarism and copyright and the implications thereof. • use a citation and bibliographic reference style.	**Unit 6** **Using digital information appropriately**
Standard 7: The program helps the student in recognising that lifelong learning requires digital information literacy.	**Outcomes:** The student can • seek to maintain current awareness. • keep up to date with digital information sources and technologies.	**Unit 7** **Keeping up to date with digital information sources**

As seen in the table above, the seven digital information literacy standards are represented by the seven units.

The units of the DILP relied on text-based material and multimedia elements. The textual content includes definitions, compact explanations and real-life examples (Hegarty, Quinlan & Lynch, 2004). The following sources were used in selecting some of the text and multimedia elements of the units:

- OLAS from the Waterford Institute of Technology Libraries (2003)
- TILT from the University of Texas System Digital Library (2004)
- PILOT from the Queensland University of Technology Library (2004)
- Microsoft Word Help from the Microsoft Corporation (2002)
- SOFWeb from the Department of Education and Training, State of Virginia, USA (2002)
- Writing essays and assignments from the Port Elizabeth Technikon (s.a.)
- Hands-on information literacy activities by Birks & Hunt (2003)
- Discovering computers 2004 by Shelly, Cashman & Vermaat (2003)
- Teaching and marketing electronic information literacy programs: a how-to-do-it manual for librarians by Barclay (2003)
- Assessing student learning outcomes for information literacy instruction in academic institutions by Avery (2003).

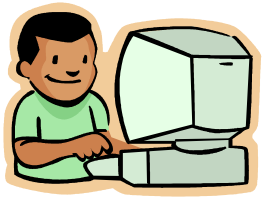
The units – with their numbers, titles, outcomes, specific content and assessment methods – were drafted off-line in printed sketch (using tables in Microsoft Word), where pieces of paper represented the pages of the various units.

The text for each unit was structured into headings, paragraphs, lists, tables, *etcetera,* to enhance the reading process in FrontPage.

Blue underlined text was used to give an indication to the Web developer where the student should be able to link to the Web or where further explanations – using mouse overs – will be given in the online DILP. Screen captures were inserted into the tables to assist the Web developer in showing him where the student should be able to link to or what the student should be able to see.

Table 6.2 gives an example of one of the off-line printed pages.

Table 6.2: Example of an off-line printed page of the DILP

Unit 3 - Evaluating digital information and its sources critically	
Textual content of Unit 3 of the DILP	**Hyperlink information**
 **After completing this unit of the DILP, you should be able to** • evaluate digital information sources and access tools. • use the criteria discussed. **Evaluating digital information and its sources** Evaluating digital information and its sources can be a complicated process. Since there are plenty of digital information and sources available that are inaccurate, fraudulent or biased (click here to see why …), it is important to determine if the sources you find are factual and verifiable. Items available *via* your library's home page are usually easier to evaluate, because they have already been reviewed by the time you see them. First, an editor verifies that the information is accurate and then a librarian determines whether the item is appropriate for the collection. Freely available Web sources usually do not pass through a review process, so you will need to look at these items more closely. How will you judge what is good information and what is not?	

6.3 Content organisation

Following the process of deciding on the content, the content had to be organised, using information maps and storyboards.

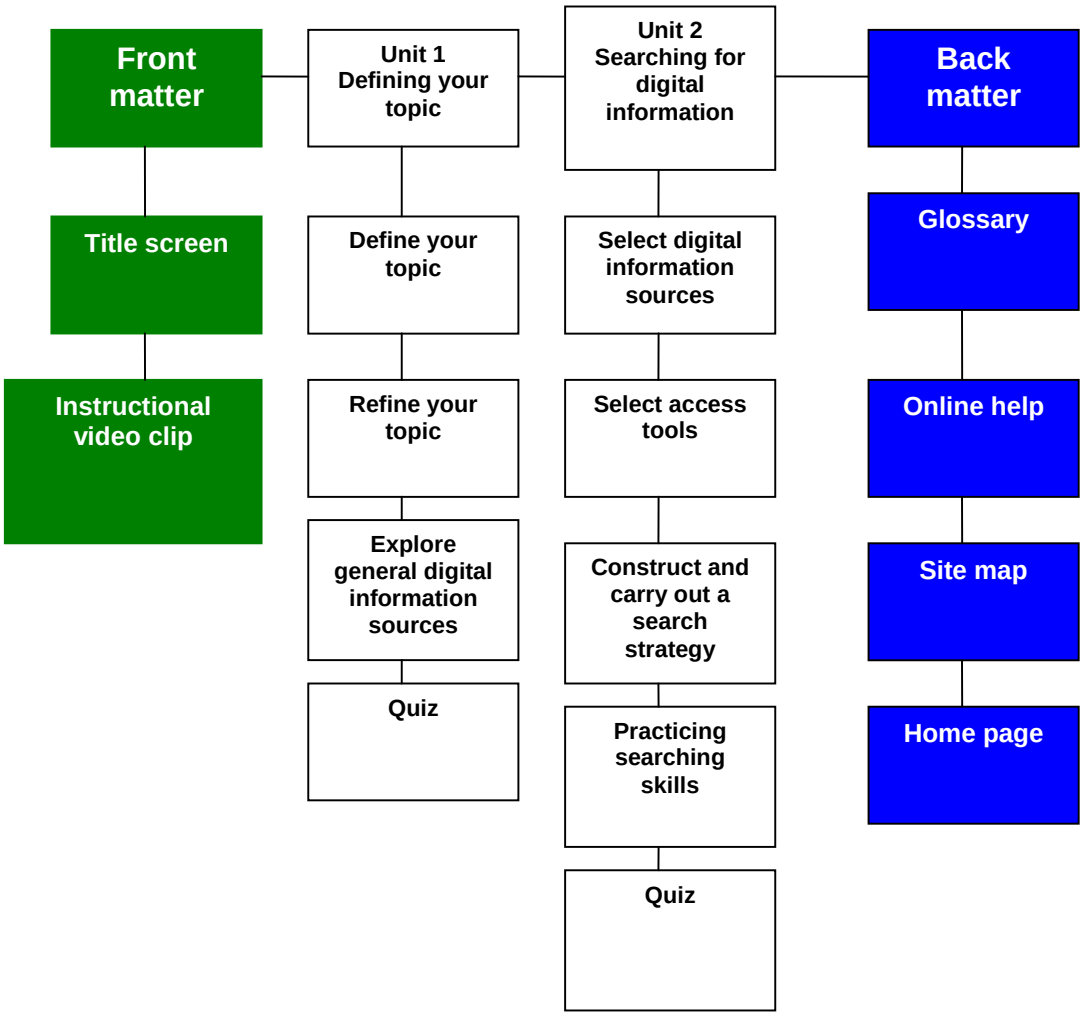
6.3.1 Information maps

Information maps are diagrams that show the overall structure of a program, making the program visible and indicating the flow from one Web page to another (Carliner, 2002:91).

An information map was used to outline the structure of the DILP (giving the bigger picture of the program). The prototype was established through the use of an information map.

The information map for the DILP contains the presentation of lesson content, applications, review and mastery testing. Figure 6.2 illustrates a part of the information map for the DILP.

Figure 6.2: A part of the information map for the DILP



6.3.2 Storyboards (page layouts)

A storyboard, according to Carliner (2002:116), is a form on which the plans for a given screen are recorded.

Storyboards were prepared for each screen of the DILP, showing the visual details, in other words, what students will see on the Web site pages. For each screen in the program a storyboard was developed.

Figure 6.3 gives an example of a storyboard that was used in the development of the DILP.

It documented the objectives/outcomes and described the media that were used on the screen – text, graphics, photographs, audio, video or a combination. The storyboard also indicated all the links and URLs. Correct and incorrect responses to questions were also documented.

Figure 6.3: Example of a storyboard

Screen 2 **of** Unit 1

title bar | Start frameset

Help : at bottom of screen in navigation bar

☑ **Menu bar** (standard) ☑ **Button bar** (standard)

Address line:C:\Documents and Settings\User\Desktop\dilp\Unit 1\Index.htm

Objectives to be covered: explaining the outcomes of this Unit and instruction to start working through the unit, use text (see Table 1 Word document) and the *Sipho* graphic.

How the content will be presented: Outcomes text (see table 1 Word document) and graphic in the middle. Top, left (also outline of Unit) and bottom

navigation bars, plus link to next page using 

← **Horizontal scroll bar** → **(please limit use)**

STATUS BAR: empty

Production instructions: Use *Sipho* graphic in middle: 

Programming instructions: Link page to Site map, Help, Glossary, The need for information, Home.

Hereafter, the Web developer authored the pages of the DILP using FrontPage.

6.4 Authoring

Authoring is the task of entering text and graphics into the computer using hardware and software (Carliner, 2002:122). Before authoring could take place, decisions had to be made regarding the hardware and software for authoring.

The hardware that was used is

- a Pentium [R] 4 CPU 2.40GHz processor with 265 MB memory.
- a hard drive with 40 GB.
- a graphics adaptor with a screen resolution of 800 x 600 pixels, 16 bit medium colour quality and a 14'' monitor.

- a CD or DVD drive.
- telecommunications consisting of a modem and telephone line.
- speakers.

Microsoft FrontPage was chosen as the authoring program (also called **Web authoring software**), as this software allows for the creation of tutorials and Web sites, which need to be visually created (Freedman, 1999:52, 989).

An advantage of FrontPage is that it is viewable on most browsers like Netscape and MS Explorer and, according to statistics, about 93% of all Internet users use MS Explorer (Lazarenko, 2004).

Another advantage of FrontPage is that, when viewing FrontPage html pages, they look exactly as they would appear in MS Explorer, therefore simplifying the design of a Web site. FrontPage is also more user-friendly and cheaper than some other Web authoring software, like Macromedia Dreamweaver.

6.4.1 The authoring process

After the content was given to the Web developer, the information was coded into FrontPage. The first draft was given for review, where some information still had to be added and/or changed.

Thereafter the logo, graphics, audiovisual components and Web page templates were added. Some of the graphics have been redesigned as they displayed rather unattractively on the Web pages (see 6.5 Additions and changes to the original content). After the second review, the different pages were linked and the following were added:

- An instructional video clip
- A loading page

- A home page from where the user can link to the seven subsites
- A site map
- Online help
- A glossary
- A page containing the sources consulted.

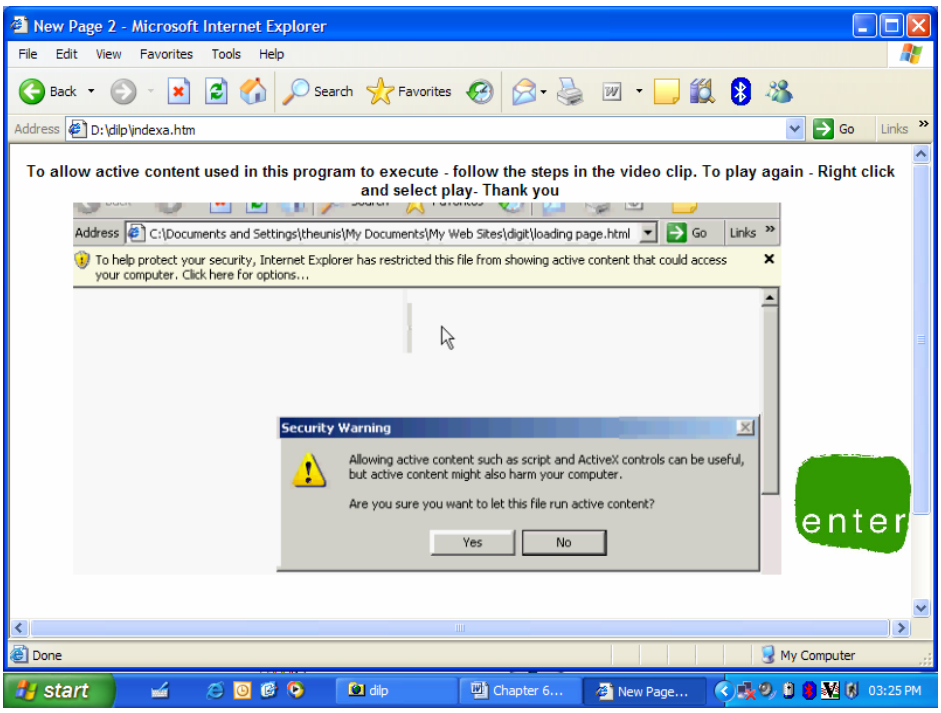
After the third review, the final changes were made, for example fonts that were still not in sansserif Arial, links that were inactive, *etcetera.*

Some problems were experienced during the authoring process. These are discussed in the following subsection.

6.4.2 Problems experienced during the authoring process

Due to the fact that Internet Explorer restricts files from showing active content, the loading page did not start downloading. To overcome this problem, a video clip was inserted instructing the user on how to allow blocked content (Figure 6.4). After blocked content is allowed, the loading page starts to download and from here the user can then enter the Web site.

Figure 6.4: Screen capture of video clip showing the user how to allow blocked content



Some of the questions in the quizzes had to be adjusted, as FrontPage cannot accept more than one correct option as an answer to a question. This is illustrated in Figure 6.5.

Figure 6.5: Example of a question that was changed

1. Which of the following are recommended criteria for evaluating digital information?

A. Author
B. Date
C. Colour
D. Content
E. Reviews

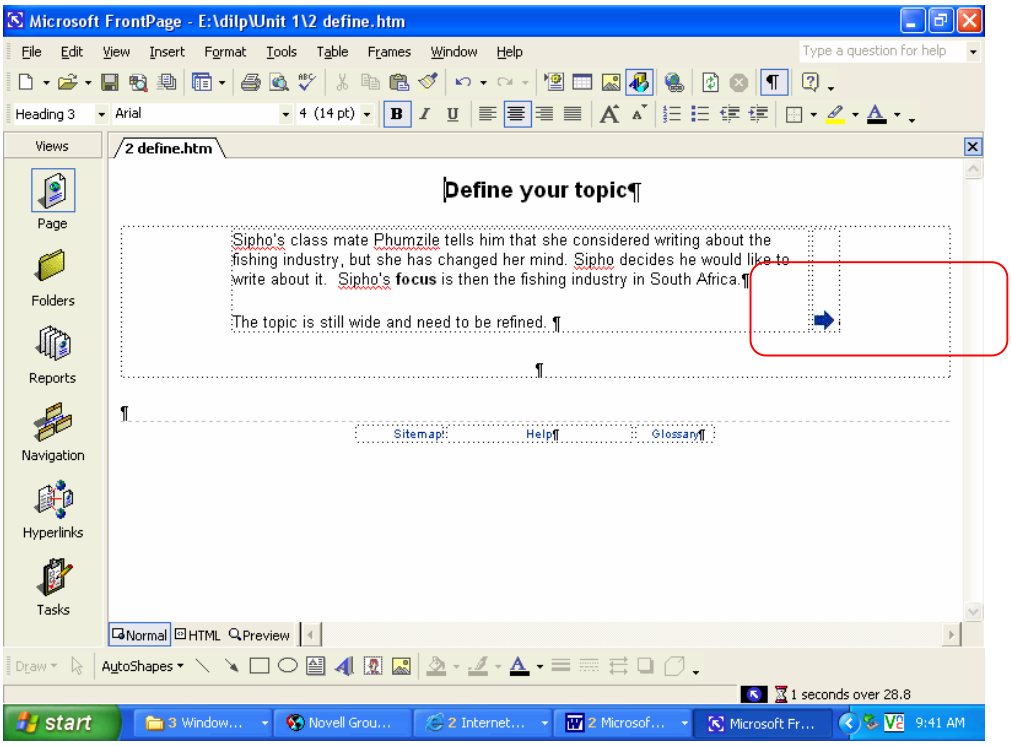
Changed to:

1. Which one of the following is not a recommended criterion for evaluating digital information?

A. Author
B. Date
C. Colour
D. Content
E. Reviews

Adding the arrows as navigational buttons to link to the next page also posed a problem. These arrows ( ) kept on moving around on the page, until the Web developer added columns to a table, narrowed the column and inserted the arrow at the bottom of the column. This is illustrated in Figure 6.6.

Figure 6.6: Adding arrows as navigational buttons



The information, originally given to the Web developer, was typed in table format using Microsoft Word. This, however, caused a problem in coding the information into FrontPage and the information had to be cut and pasted into a plain Microsoft Word document using the intended font – sansserif Arial.

The downloading time of the video in Unit 4: Digital information formats, was too long and had to be replaced with a video with less kilobytes (KB).

More interactive elements were originally planned. However, these elements slowed down the downloading time of certain pages, which might result in the user losing interest in the program. These elements were therefore not added to the DILP.

Unit 2 contains an interactive search activity using live databases. To ensure that the correct database page opens in a second frame – and the student sees the correct page for the specific activity – the Web developer had to save some of the actual pages from the databases into the DILP. This is illustrated in Figure 6.7.

To ensure that the students see the document request page, it had to be saved from the database into the DILP, otherwise the student would have seen a screen as illustrated in Figure 6.8 – which is not a document request page or a full-text article.

Figure 6.7: Document request page

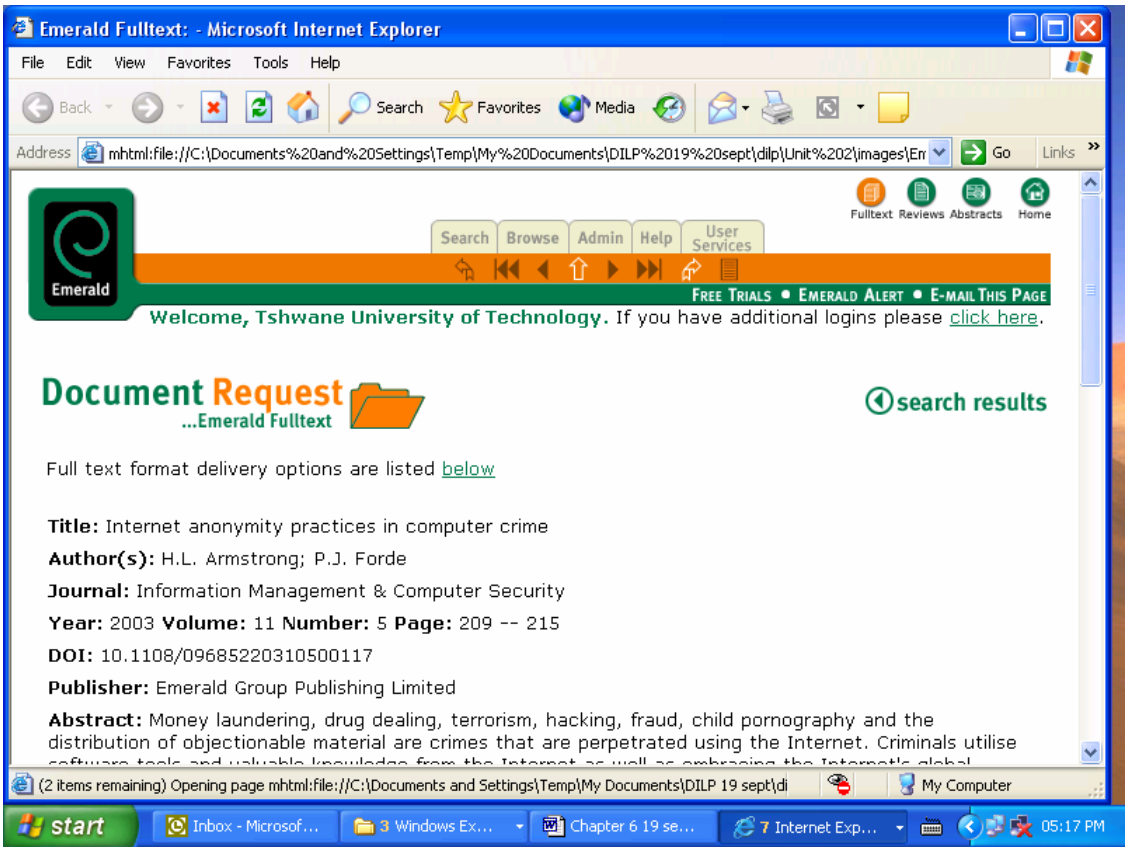
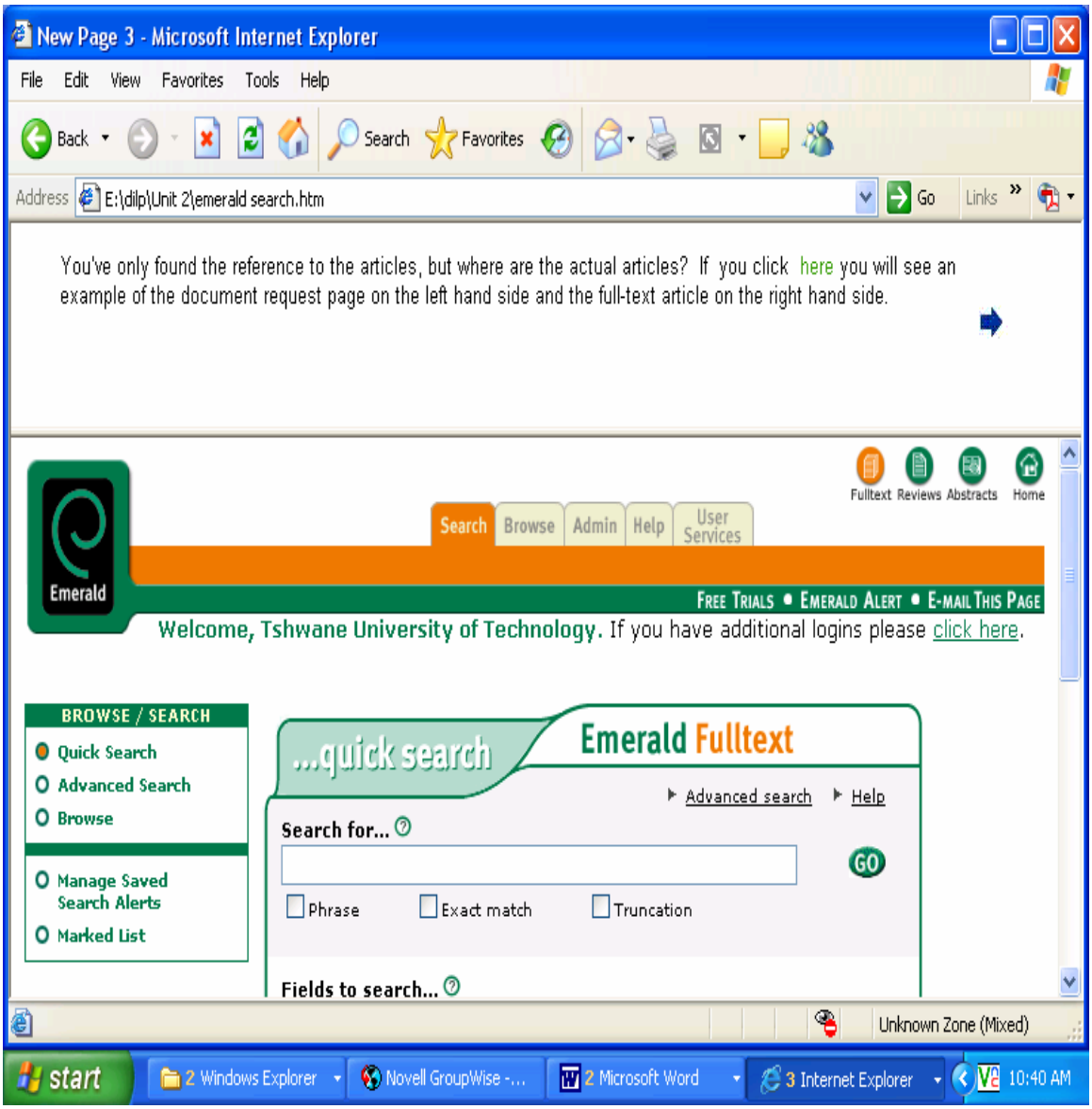


Figure 6.8: Incorrect database page



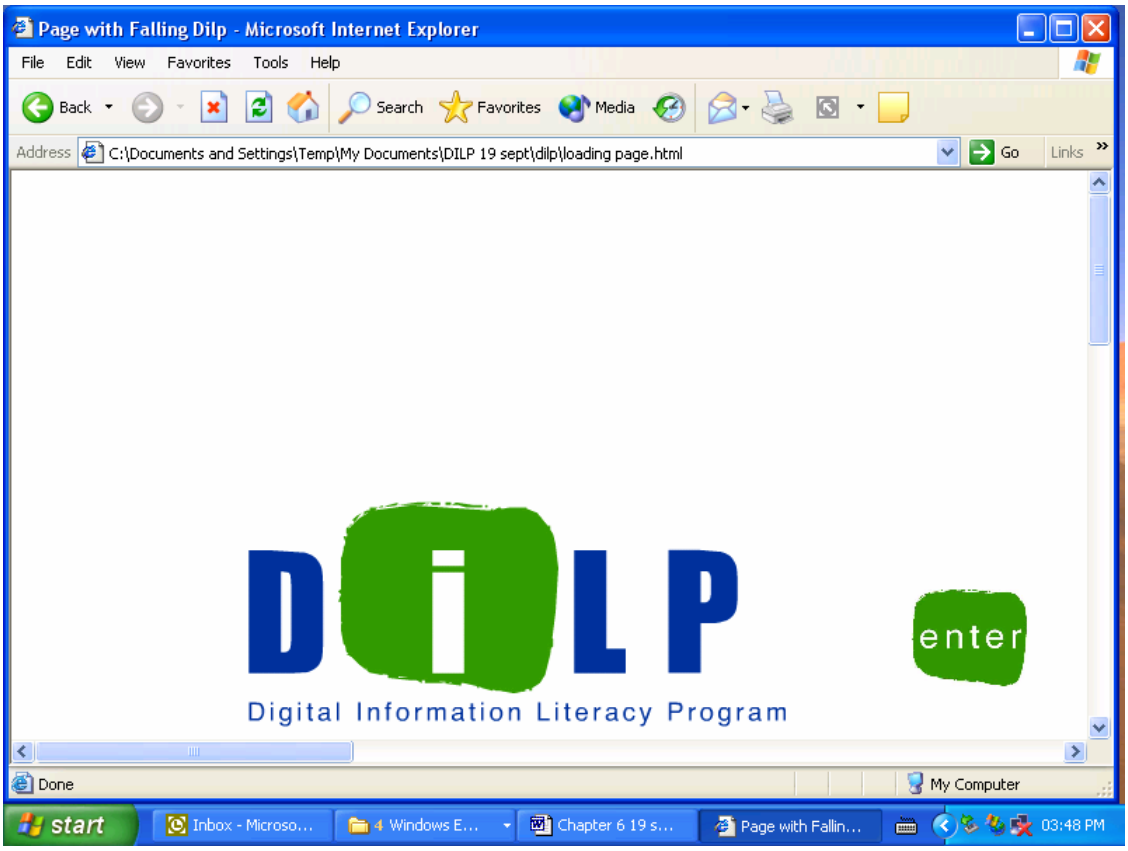
6.5 Additions and changes to the original content

Screen captures from the DILP are used, where possible, to illustrate the additions and changes that were made to the original content.

The opening page was replaced with a loading page (see Figure 6.10), as one only has three minutes to get the user's attention and keep him/her interested in the program/Web site. The original opening page was also uninteresting (see Figure 6.9).

Figure 6.9: Original opening page of the DILP

Figure 6.10: Loading page



An introductory page was added to introduce the students to digital information literacy (see Figure 6.11).

Figure 6.11: Introduction to digital information literacy

The logo was redesigned and replaced with the one in Figure 6.12, as the original one displayed rather unattractively in the browser and there were more than three colours in the original logo.

Figure 6.12: Redesigned logo

As the display in the browser differs from the display in the original off-line printed format, some of the images were also changed during authoring.

Figure 6.13: Example of a changed image

This changed

to this:

The little boy looked too immature and not like a student.

A glossary, help screen and site map were also added to the original content. These are depicted in Figure 6.14, 6.15 and 6.16.

Figure 6.14: Glossary

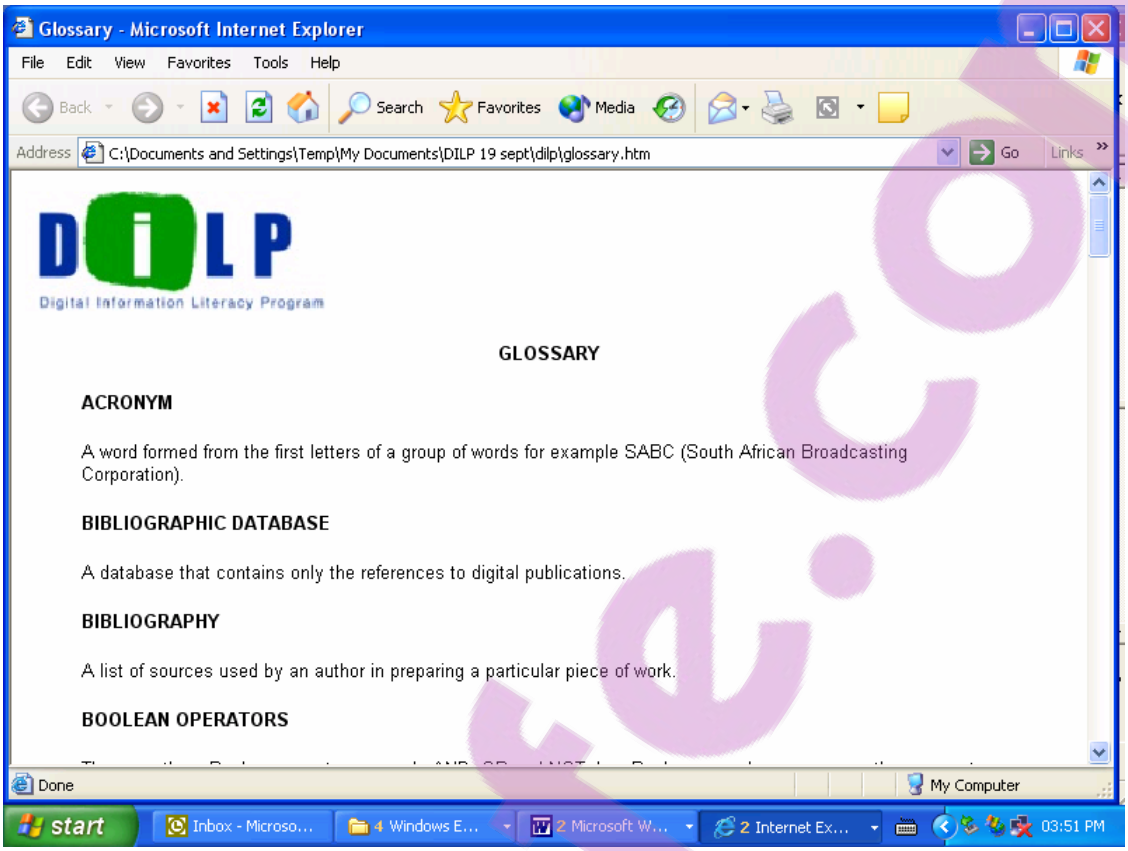


Figure 6.15: Help screen

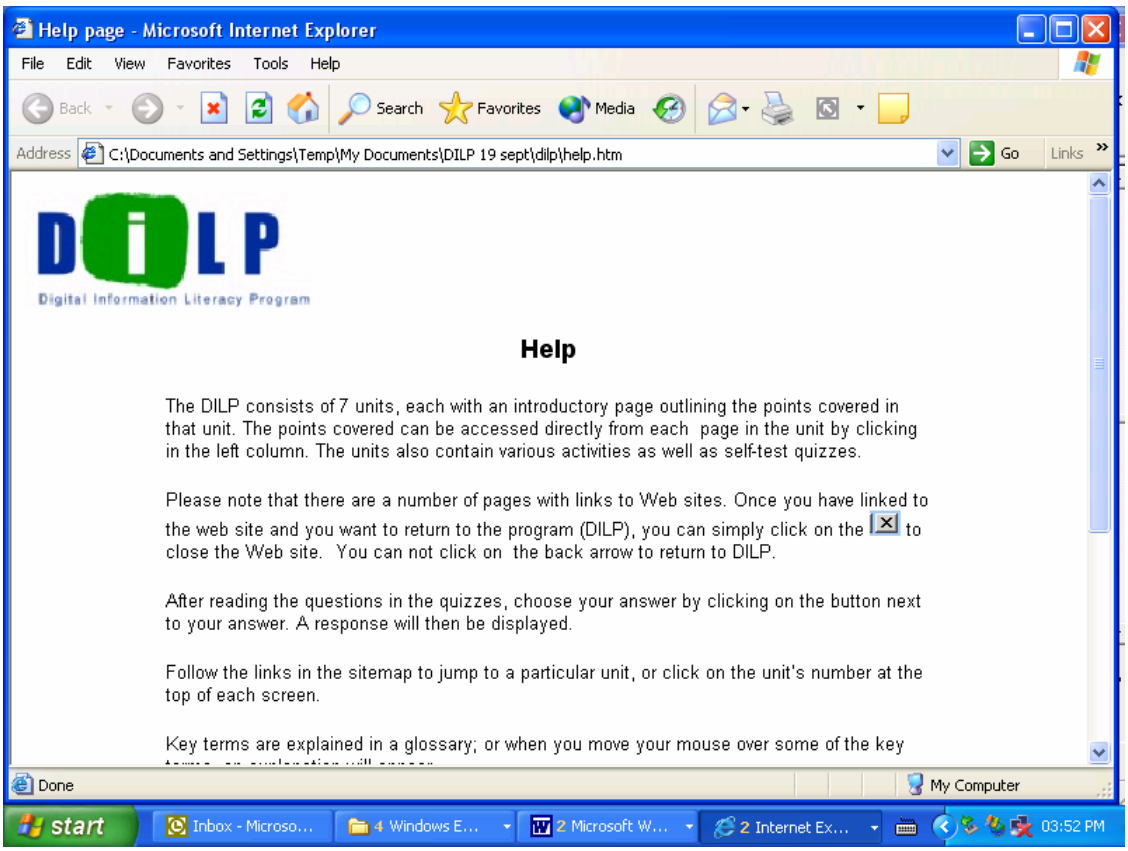


Figure 6.16: Site map

6.6 Changes in the design of the DILP

Screen captures from the DILP are used, where possible, to illustrate the additions and changes that were made to the original **design.**

6.6.1 Navigational buttons

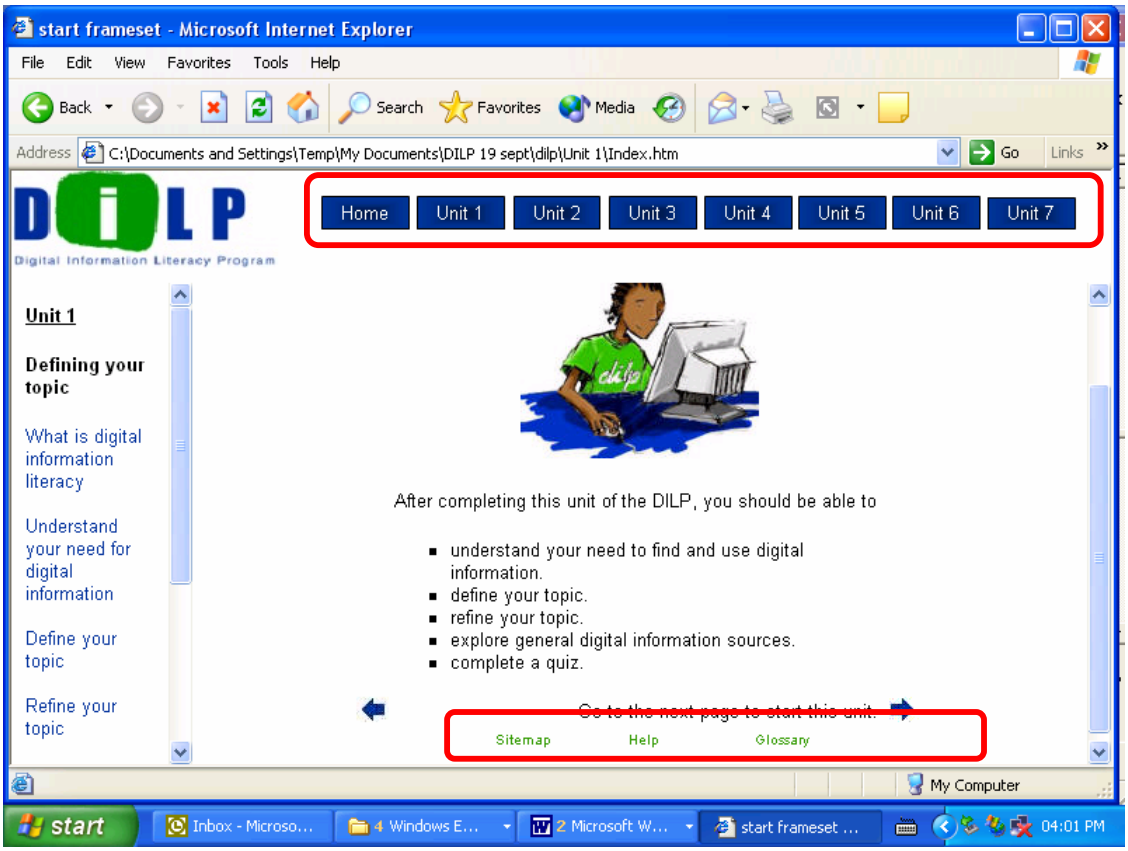
Apart from the text hyperlinks, buttons were also added in navigation bars (at the top and bottom of the pages) to assist in the navigation. These buttons include the following:

- Indicate the various units (top)

- Link to the home page (top)
- Site map (bottom)
- Glossary (bottom)
- Help (bottom).

These buttons are encircled on the screen capture (Figure 6.17).

Figure 6.17: Navigational buttons



6.6.2 Colours and backgrounds

Web safe blue and green were chosen as they appear consistent on any computer monitor or Web browser. Each colour's hexadecimal value and the RGB (Red, Green, Blue) values are indicated in the table below.

Table 6.3 Hexadecimal value and RGB colour codes for colours used in the DILP

Green	Hexadecimal value - #339900	RGB colour code – R=51 G=153 B=0
Blue	Hexadecimal value - #003399	RGB colour code – R= 0 G=51 B=153
Blue	Hexadecimal value - #66CCFF	RGB colour code – R=102 G=204 B=255

(Web-Source.net, 2005)

Black was used for headings as it adds life to white background pages.

6.6.3 Typography

In Chapter 5, it was stated that a 12-point type for body text was used. This, however, was changed to a 10-point type to make use of the limited space in the browser window.

It was also mentioned in Chapter 5 that underlined text would be used to indicate hyperlinks. The hyperlinks are, however, not underlined in the final version of DILP but are blue in colour, for emphasis.

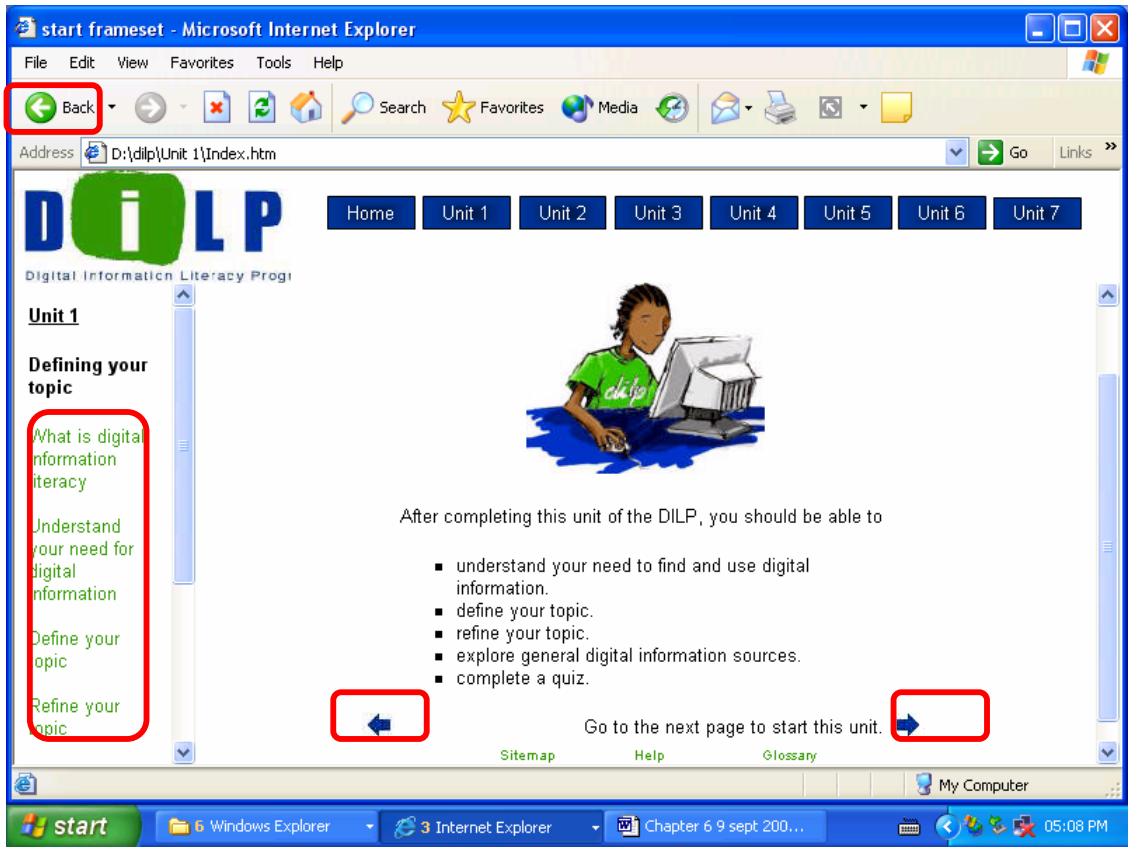
6.6.4 Local navigation

No backward arrows were originally used as local navigation devices, as this would have caused too many navigational options, which might confuse the student.

Although the student can navigate backwards by clicking on the outlines in the left frame or BACK in the button bar, it was decided to add backward arrows, as

the students indicated during the evaluation process that they would prefer this option (see Figure 6.18).

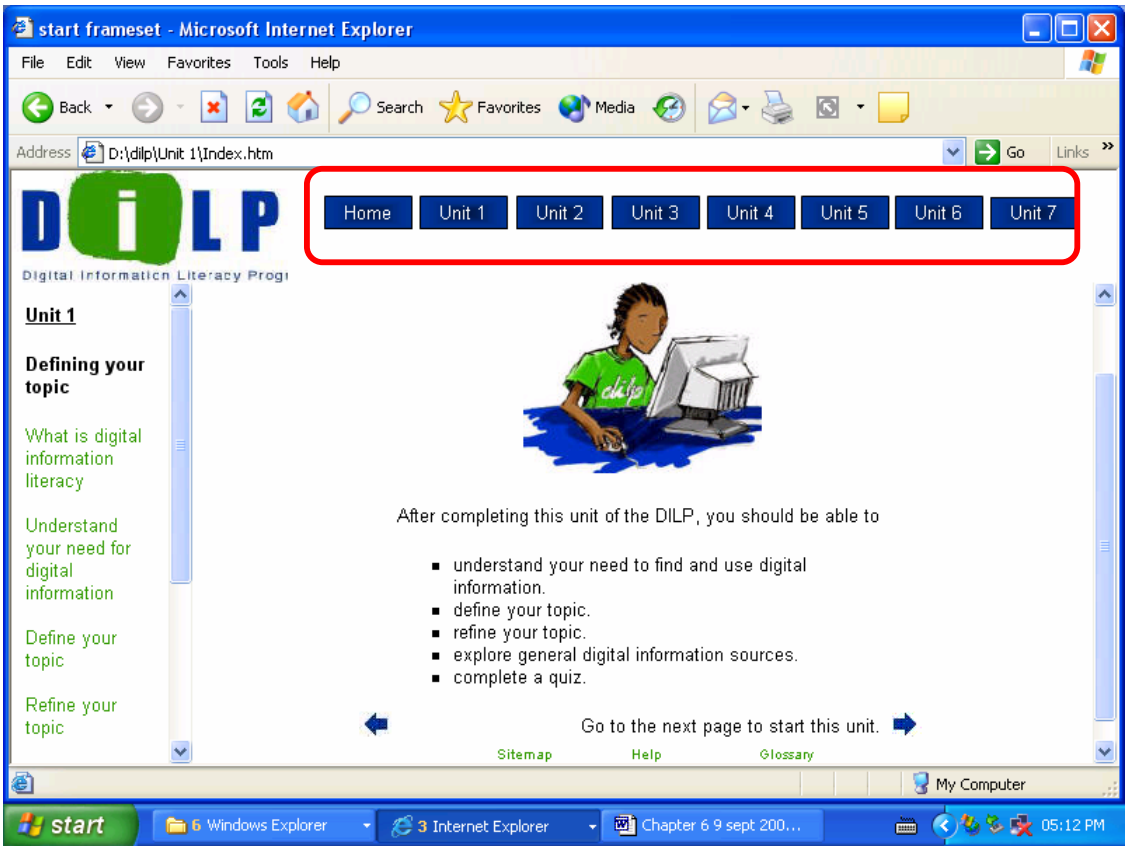
Figure 6.18: Local navigation



6.6.5 Site architecture

In Chapter 5 it was mentioned that the flexible approach was achieved by using a left-hand navigation panel, providing access to all the units of the DILP. These were, however, moved to the top right-hand side of the screen into a navigation bar, to improve navigation (see Figure 6.19).

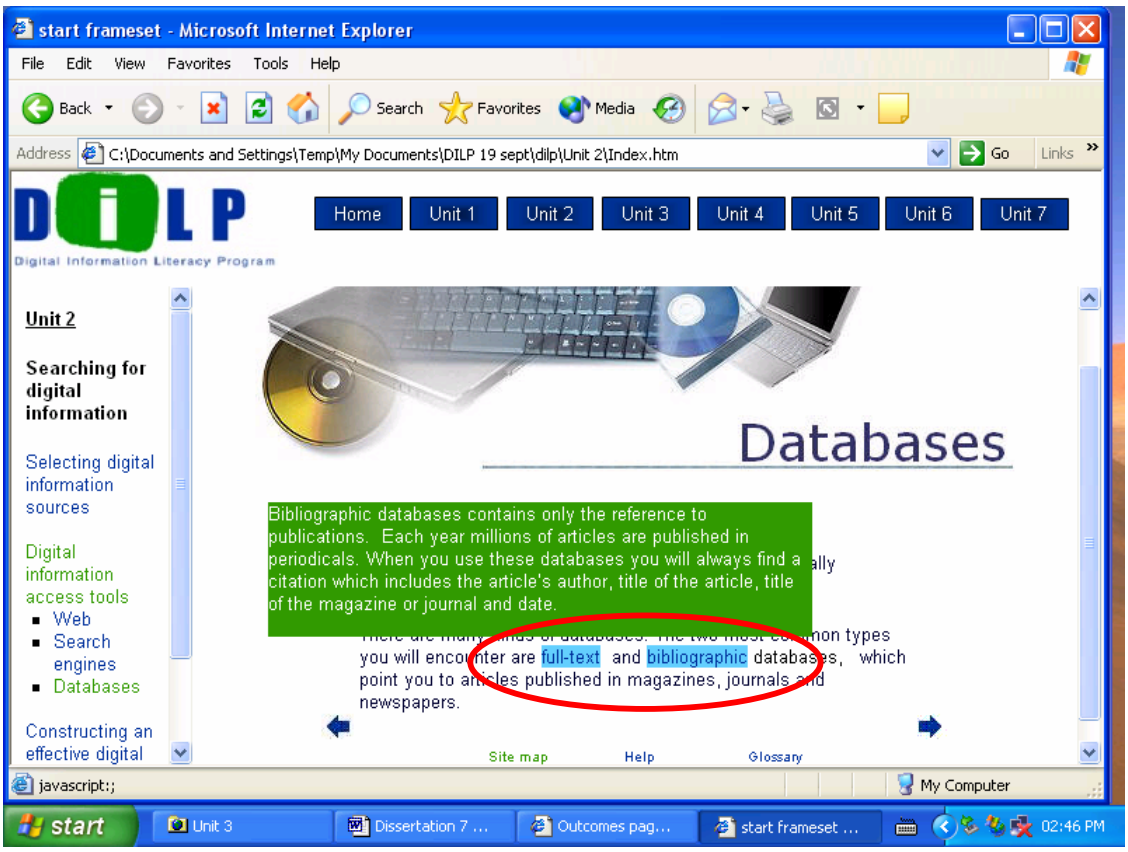
Figure 6.19: Site architecture



6.6.6 Emphasis

Apart from the headings and graphics that were used to place emphasis on something, **blue** mouse overs were used to explain certain terms, illustrated in Figure 6.20.

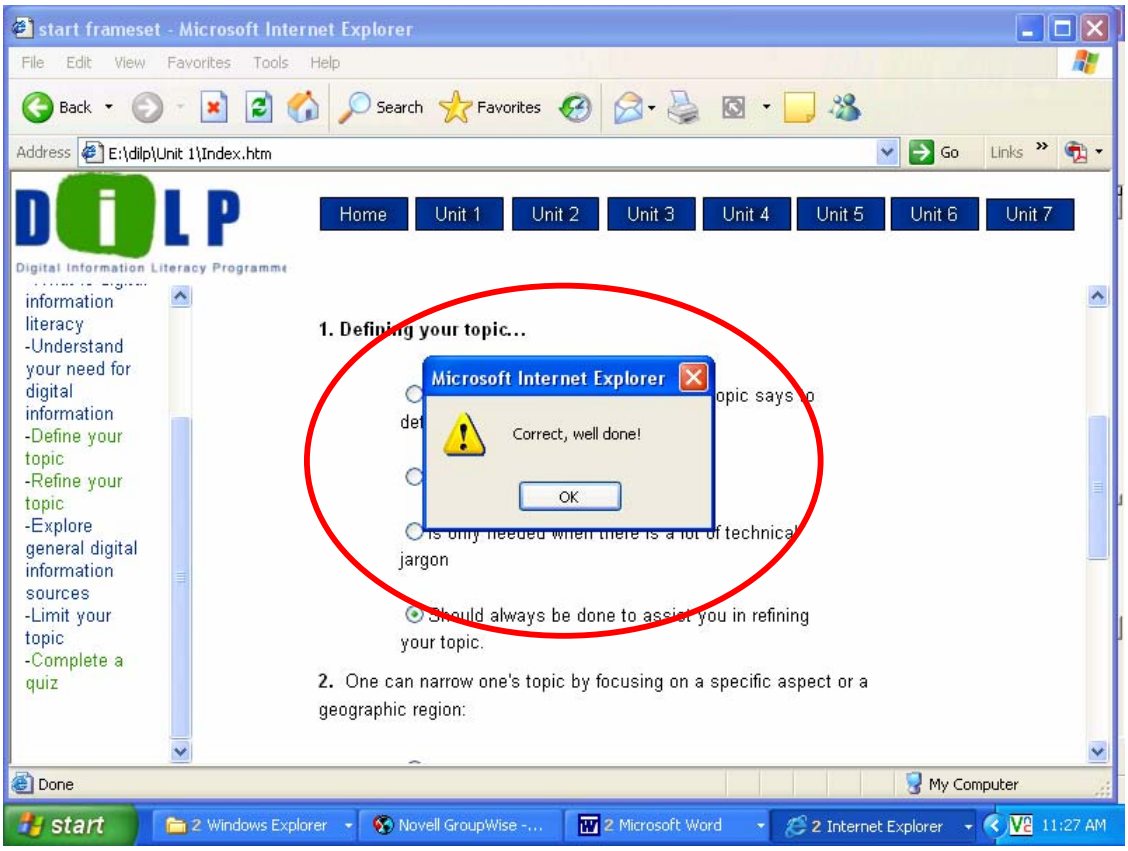
Figure 6.20: Mouse overs for emphasis



Answers to the quizzes were given in the form of message boxes. These are boxes that appear in Microsoft Windows with a default sound and text containing messages to the user. They were used because they place emphasis on the answer (see Figure 6.21).

Due to a time constraint, the default message boxes of Microsoft were used and not customised ones, as it requires a lot of time and effort to redesign these message boxes.

Figure 6.21: Message box for emphasis



6.7 Technical requirements for authoring

The following table lists the hardware and software which were used during the authoring process.

Table 6.4: Hardware and software used during the authoring process

Hardware	☑/☒	Description
Processor	☑	Pentium [R] 4 CPU 2.40GHz
Memory	☑	265 MB
Hard drive	☑	40 GB
Graphics adaptor	☑	Screen resolution: 800 x 600 pixels; colour quality: medium - 16 bit

Hardware	☑/☒	Description
Monitor	☑	14” screen
Zip drive	☒	
CD or DVD drive	☑	52X or 56X
Telecommunications	☑	Modem, telephone line and a communications program
Scanner	☒	
Printer	☑	
Digital camera	☒	
Speakers	☑	
Other	☒	
Software	**☑/☒**	**Description**
Operating system	☑	Microsoft Windows XP
Office software	☑	Microsoft Office 2002
Authoring system	☑	Microsoft FrontPage 2003
Graphics software	☑	MS Paint
Photography software	☒	
Testing software	☒	
Music software	☒	
Video software	☑	Microsoft Windows Media Player 10 (download from www.microsoft.com) or Macromedia Flash Player 7 (download from http://www.macromedia.com).
Browser	☑	MS Internet Explorer 6
Other	☑	Anti-virus software; Camstudio

6.8 Checklists

To ensure that all the demographics, characteristics and learning characteristics of Generation Y, the criteria and characteristics for a model DILP, the presentation of a DILP and the design criteria, principles and elements of design

for a DILP were incorporated and presented in the DILP (as stated in the previous chapters), a checklist was drawn up.

The checklist served as a control mechanism to ensure that all the elements were present or, if not possible, substituted with something else.

An example of a checklist can be seen in Table 6.5.

Table 6.5: Part of the checklist for Chapter 5

Chapter 5	✓/×	**Example of how it was achieved**	**Additions/Changes**
Interactivity	✓	Activities and quizzes, with immediate feedback using message boxes	
Graphics	✓	Logo and others	
Animations	✓	Loading page	
Simulations	✓	Helping Sipho - Unit 1	
Site architecture: flexible site architecture	✓	View content in any order; skip and go to any unit at any given time	Units are also available from home page and other parts of the site
Navigation: local	✓	Arrows	
Hierarchical menus	✓	Double click on first level to view secondary menu	
Home button at top	×	Used the word **Home**	 Home replaced with the word HOME at bottom.

6.9 Technical requirements for using the DILP

A list of the technical requirements for using the DILP is included to ensure that the user and reader of this dissertation – and of the DILP – will have the specified requirements in order to use the DILP.

Table 6.6: Technical software and hardware requirements for using the DILP

Hardware	☑/☒	Description
Processor	☑	Pentuim III 600MHz
Memory	☑	128 MB
Hard drive	☑	However, it is not necessary to install the DILP on hard drive as the program can run from the CD-ROM drive
Graphics adaptor	☑	Screen resolution: 800 x 600 pixels; colour quality: medium - 16 bit
Monitor	☑	14” screen
Zip drive	☒	
CD or DVD drive	☑	52X or 56X
Telecommunications	☑	Internet connection
Scanner	☒	
Printer	☑	
Digital camera	☒	
Speakers	☑	
Other	☑	Internet Information Server (IIS) if the DILP should run on server
Software	**☑/☒**	**Description**
Operating system	☑	Microsoft Windows 98, recommended: Windows 2000 or XP
Office software	☒	
Authoring system	☒	
Graphics software	☒	
Photography software	☒	
Testing software	☒	
Music software	☒	

Software		Description
Video software	☑	Microsoft Windows Media Player 10 (download from www.microsoft.com) or Macromedia Flash Player 7 (download from http://www.macromedia.com).
Browser	☑	Internet Explorer 6
Other	☑	Anti-virus software; FrontPage extensions 2002 (if the DILP should run from a server)

6.10 Evaluation and testing of the prototype

Formative evaluation was done in order to gather information to synthesise ideas for recommendations and further improvement of the DILP (Brandt, 2002:107).

Formative evaluation takes place from the design phase until the product is delivered to ensure instructional soundness, quality and sustainability of the program. It is therefore an essential part of the development process.

The evaluation involved an informal survey, where members from the target audience (Generation Y students) were given an evaluation form to complete after having worked through the DILP. The completion of the form was done anonymously. An example of the evaluation form can be seen in Figure 6.22.

Since formative evaluation was used, no complex sampling was needed. Students with low and high levels of computer literacy skills were identified during library information training sessions. The first five volunteers from the identified group of students were then requested to take part in the evaluation process.

Only five students were used, as Nielson (2000) states that the cost-benefit analysis of evaluation provides the optimal ratio with three or five users. Nielsen

(2000) further explains that by adding more users one will not necessarily learn anything new, as the same responses will appear repeatedly.

Small incentives were offered to attract participation in the evaluation of the DILP.

Figure 6.22: Evaluation form

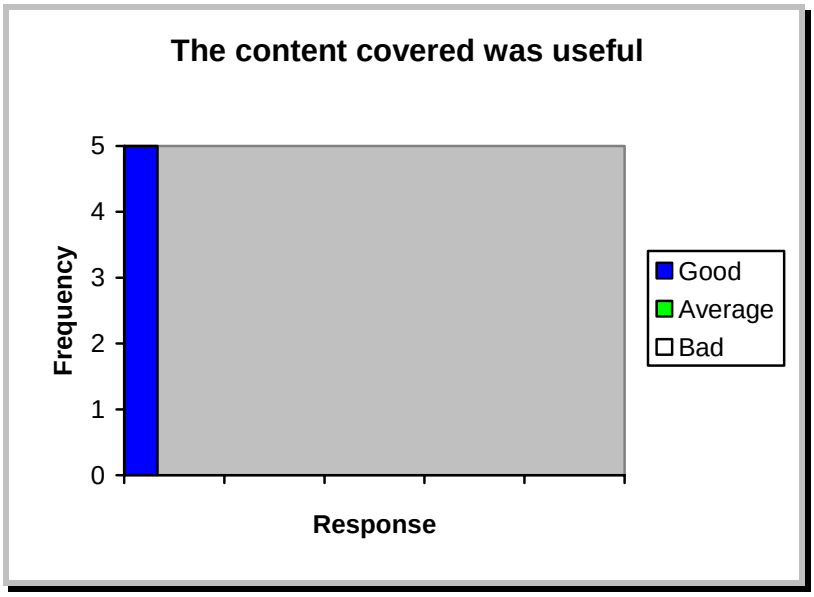
The DILP evaluation **Please rate the following aspects of the program by placing an X on the image that best reflects your attitude:**			
The content covered was useful	☺	😐	☹
Instructions were satisfactory	☺	😐	☹
The objectives and outcomes of each unit were clear	☺	😐	☹
Presentation techniques were creative	☺	😐	☹
A variety of media is used to present the content	☺	😐	☹
Screens are visually pleasing	☺	😐	☹
The font is easily readable	☺	😐	☹
I could easily find my way out of the program or jump to other units if I wanted to	☺	😐	☹
Overall reaction to the program	☺	😐	☹
How long did it take you to complete the program? _____ _____ What did you like about the program? _____ _____ _____ How can the program be improved? _____ _____ _____			

The evaluation form used was a combination of forms used by Leatherman (1990:79) and Brandt (2002:109).

6.11 Outcomes of the evaluation and testing of the prototype

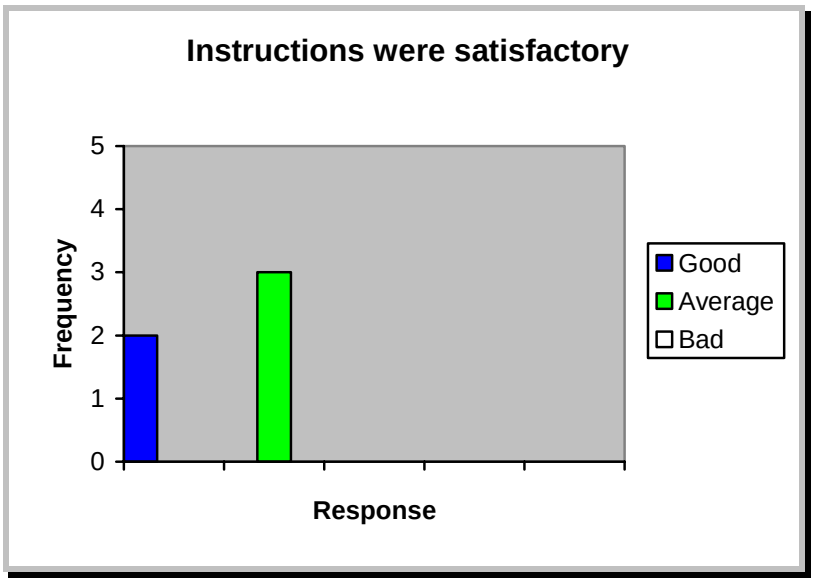
As mentioned in section 6.10, evaluation was done in order to gather information to synthesise ideas for recommendations and further improvement of the DILP. The bar charts in figures 6.23 to 3.60 illustrate the responses of the students. Interpretations of the responses are also given.

Figure 6.23: The content covered was useful



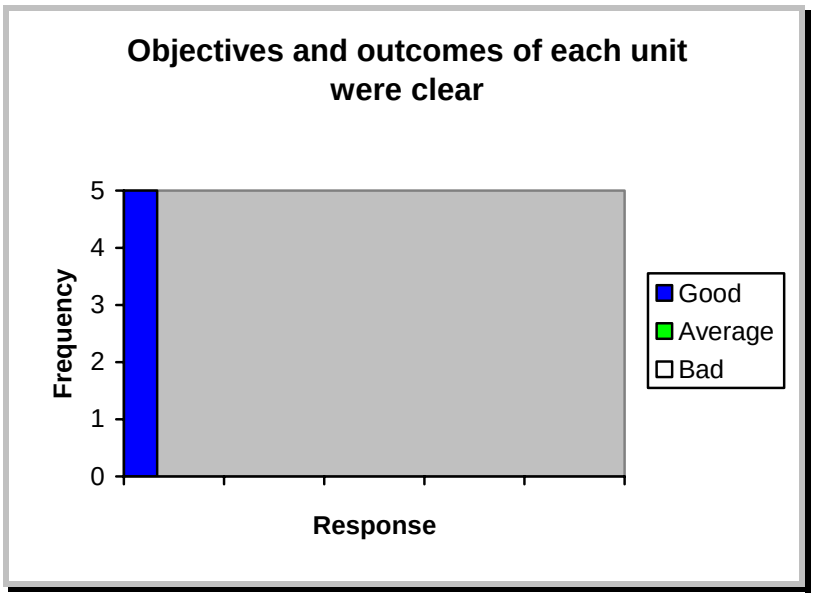
All the students found that the content covered was useful, therefore no changes were made.

Figure 6.24: Instructions were satisfactory



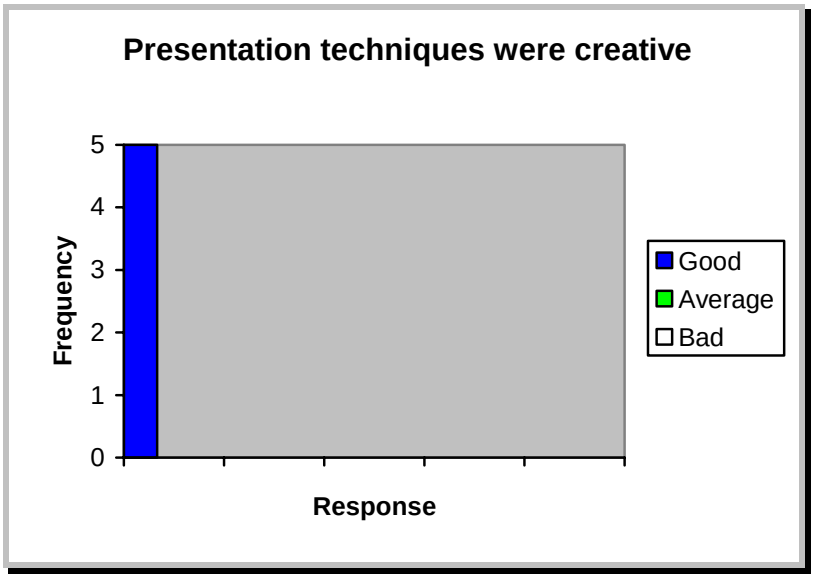
This was one of the few questions where the majority of the students felt that an improvement was necessary. As a result of this, some instructions were added to the HELP page of the DILP. An example of an instruction that was added is the instruction for completing the quizzes. The students felt that the original instruction was not very clear.

Figure 6.25: The objectives and outcomes of each unit were clear



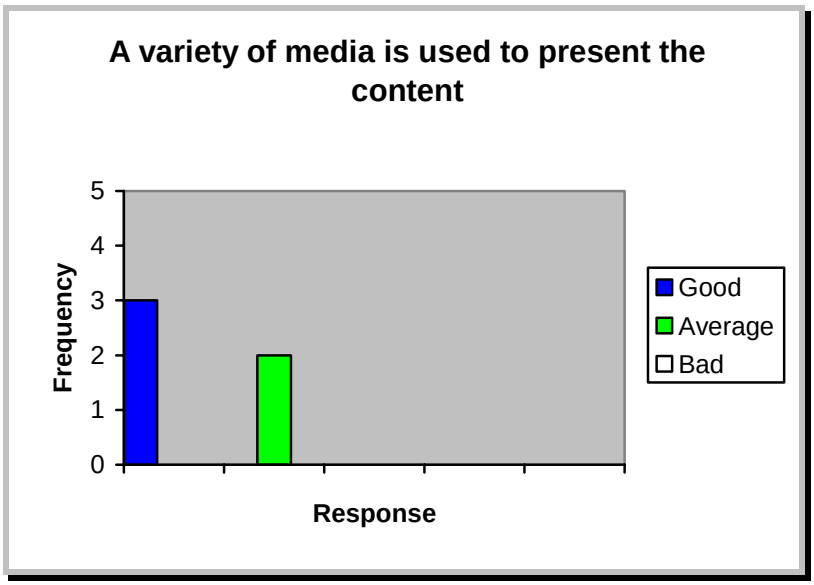
As indicated by the bar chart, students all agreed that the objectives and outcomes were clear and therefore these were not altered in the DILP.

Figure 6.26: Presentation techniques were creative



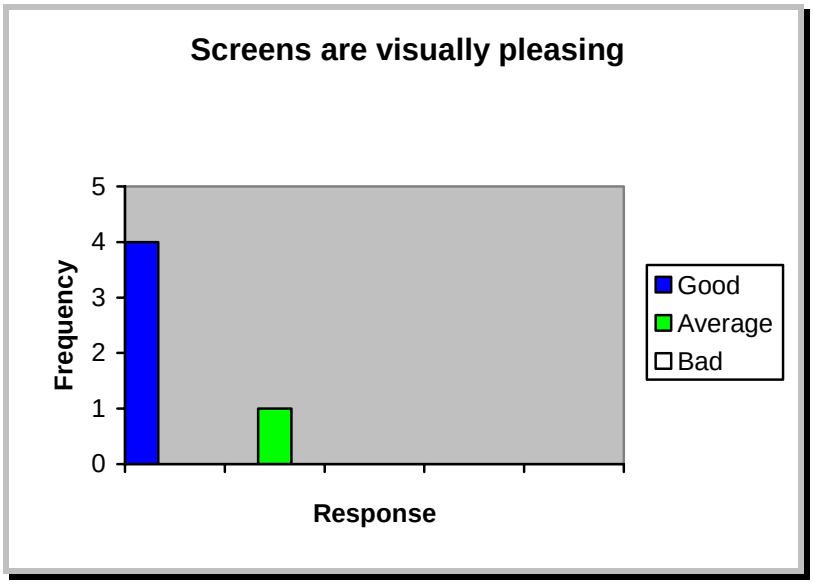
The students all agreed that the presentation techniques were creative.

Figure 6.27: A variety of media is used to present the content



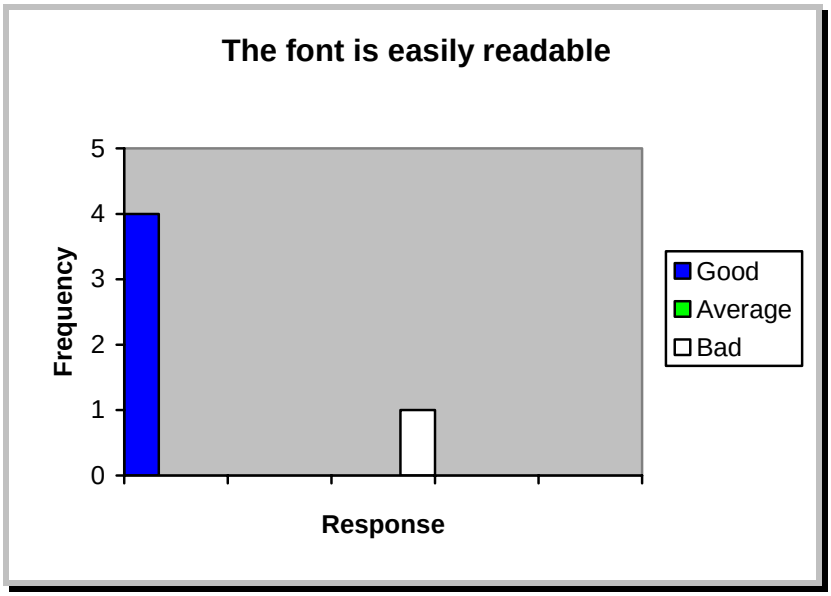
Although 40% of the students indicated that the variety of media used was not adequate, no changes were made. The students could not experience the full range of media due to restrictions placed on some of the computers used in the laboratory where the evaluation took place.

Figure 6.28: Screens are visually pleasing



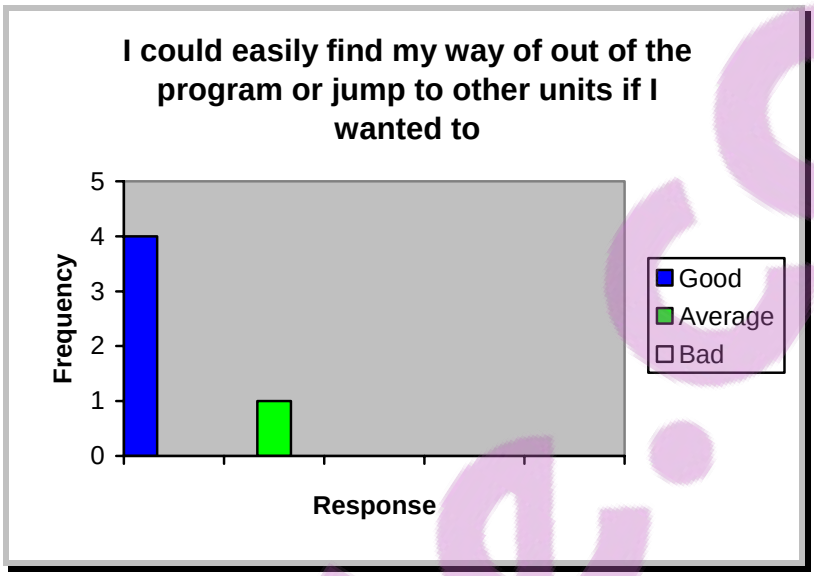
As only 20% of the students did not find the screens visually pleasing, it was decided not to alter any of the screens, bearing in mind that a small difference in opinion is deemed acceptable.

Figure 6.29: The font is easily readable



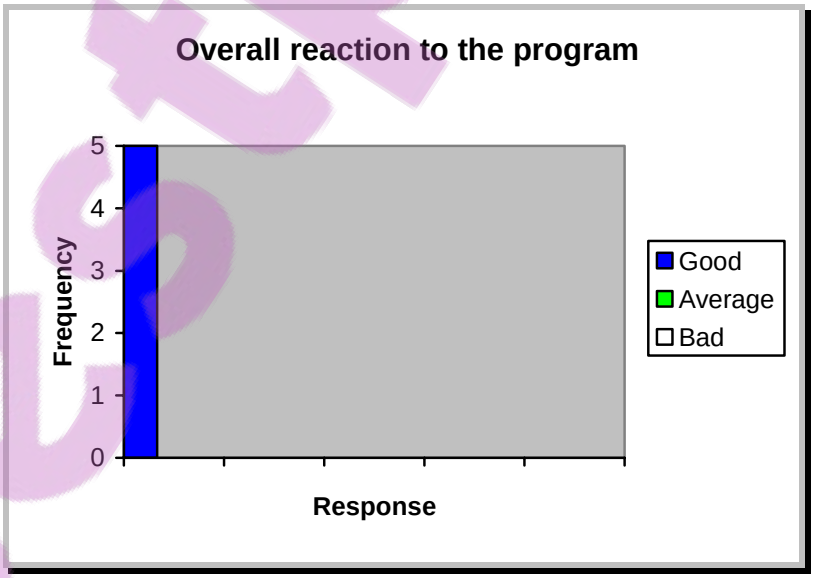
Although 20% of the students felt that the font was not easily readable, it was decided not to change the font size or type. According to research, the sansserif Arial is one of the easier fonts to read on-screen and it is also a common typeface. The font size was not changed to a bigger 12-point type, because of the limited space in the browser window.

Figure 6.30: I could easily find my way out of the program or jump to other units if I wanted to



The majority the students found the navigation options user-friendly. However, it was decided to add backward arrows, to improve the local navigation. Information on how to jump to other units or to find their way out of the program was also added to the HELP page of DILP.

Figure 6.31: Overall reaction to the program



It is evident from the above that the students were satisfied with the program. However, certain changes – as indicated – were made to the DILP. It can therefore be concluded that the design and development of the program were efficient.

Responses from students indicated that the average time taken to complete the program is one hour 36 minutes.

The responses of students, about **what they liked about the program**, are as follows:

- ''The outcomes of the program are clearly defined.''
- ''It gives the necessary information on how to do an assignment.''
- ''The content and information provided is [sic] really excellent.''
- ''The highlighted words throughout the program, when you place pointer over the word, the meaning or short description pops up.''
- ''The program is user-friendly.''
- ''The quizzes at the end of each unit.''
- ''The program is very informative.''
- ''The organisation of the units is very effective.''
- ''Every unit has it's [sic] own title and objectives.''
- ''I liked learning about the different search engines available and also the quiz after each unit.''

Table 6.7 indicates the responses that were given about **how the program can be improved** and the changes that were subsequently made to the DILP:

Table 6.7: How the program can be improved

Response	Changes made to the DILP
''I don't think it needs any improvement cause [sic] it's fun and challenging and I enjoyed every moment. ''	No changes were made.
''The instructions for the quizzes were not very clear.''	The instructions changed from: The final section of this module is a 9 question quiz. After reading the question, choose your answer and click the submit button. Occasionally the question is a bit longer than the frame and you might have to scroll down to find the submit button. DILP will then display a response to your answer. Read the response then click the link to the next question. You can take the quiz as many times as you wish. **to** After reading the question, choose your answer and click the button next to it. We will then display a response to your answer. Read the response and then go to the next question.
''Increase the font size of the glossary title.''	The font size of the glossary title was changed from a 10-point to a 12-point type for body text.

Response	Changes made to the DILP
'' … with more pictures.''	The Sipho character with the speech bubble was added to all the units. For example: 
''Allow the user to navigate backwards.''	Backward arrows (⬅) were added to all the pages.
''The program was awesome, it does not need improvement, but I think more information on computer viruses will be necessary.''	No additional information about computer viruses was added, as it was not possible to establish what additional information about computer viruses the student really wanted – the questionnaires were anonymous.

6.12 Producing the DILP

After the evaluation took place and the researcher tested the DILP, it was ready for production. A master copy was prepared and duplicated on a Web published CD.

This format can be used to post the DILP on an intranet, extranet or Internet site (Carliner, 2002:24). Further copies of the DILP were also ''burned'' on CD-ROMs.

Related materials such as the CD jackets were also designed and duplicated.

6.13 Summary

This chapter dealt with the development of the DILP by deciding on and organising the content of DILP. This was done by drafting the content off-line in printed sketch, where all the units were represented in paper format using

storyboards. The text for each unit was structured into headings, paragraphs, lists, tables, *etcetera* to enhance the reading process.

It was important to organise the content of the DILP first, before authoring in FrontPage took place, as McDaniel (2003:209) states that content organisation is the key to a successful program.

Thereafter the DILP was developed by

- authoring.
- applying the elements of design.
- using a checklist, to ensure that the guidelines and criteria established in the previous chapters were met.
- stating the technical aspects.
- evaluating and testing of the prototype.

The DILP is available on a Web published CD.

The final conclusions and recommendations follow in Chapter 7.

Chapter 7

Conclusions and recommendations

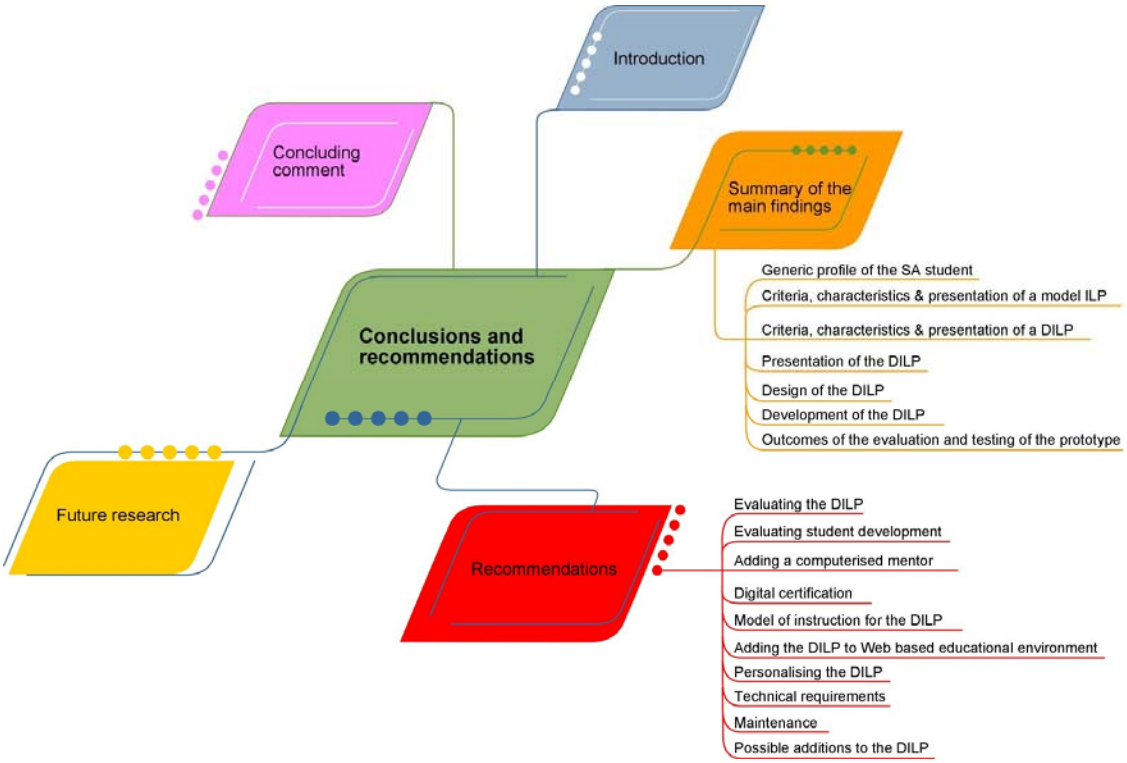
7.1 Introduction

The aim of this study was to design and develop a DILP for an academic library. The study also explored the profile of Generation Y as well as the criteria for a digital information literacy program and, subsequently, the integration of these with the design and development of the DILP.

This final chapter of the dissertation furnishes

- a summary of the main findings (resulting from the research objectives).
- recommendations for the improvement of the DILP in general.
- possible future areas of research related to this study.

Figure 7.1: Mind map to illustrate chapter content



7.2 Summary of the main findings

A summary of the main findings and subsequent conclusions is presented in this section.

7.2.1 Generic profile of the South African student at higher education institutions

From the literature review it is evident that the South African student forms part of the so-called Generation Y. This Generation has certain demographics, characteristics, learning characteristics, learning style preferences and expectations.

With regard to the **demographics**: these students fall into the age bracket 18 - 24; one in 14 is Caucasian; 42% of Web users are from this Generation; they prefer action to observation and it is reported that they feel overwhelmed and pressed for time.

Their **characteristics** had certain implications for the DILP. These are tabulated in Table 7.1.

Table 7.1: Characteristics of Generation Y and the implications for the DILP

Characteristic	Implication
Positivism	Positive abilities with technology ease the usage of the DILP, since technologies such as computers figure positively in Generation Y's worldviews.
Technology as motivation	Technology – in this case – is computers. To motivate the students, computers are used to instruct them.
Visual orientation	The DILP is visually orientated, and uses appropriate graphics, animation and interactive exercises to enliven it.
Choice in products	Students can choose between the units that they want to view in the DILP.
Short attention span	It takes no longer than 30 minutes to complete a unit of the DILP.
Boredom	The DILP engages students and presents students with various activities to complete.
Peer learning	Students assist a character, named Sipho in various activities.

Characteristic	Implication
Importance of mentors	The mentor, working in co-operation with the students and the DILP, is a human mentor – the librarian.
Memorisation	The same layout and style are used throughout the program, to facilitate memorisation.
Multitasking	The student must complete several tasks in the DILP (simultaneously).
Lack of critical-thinking skills	The DILP uses the application of information to improve critical-thinking skills.
Diversity of academic skills	The DILP, for example, provides students with guidelines for the planning and writing of an assignment.
Teamwork	Some assignments in the DILP must be completed as a team.
Non-linear interaction with information	The DILP uses hypertext, since hypertext – in its essence – is non-linear and links related topics/text.

The following **learning characteristics** were identified in the literature and addressed in the DILP:

- Active students
- Experience-based
- Hands-on
- Task-centred
- Problem-centred
- Solution-driven

- Value-driven
- Skill-seeking
- Self-directing
- External and internal motivation.

Table 7.2 indicates how the above-mentioned characteristics were applied in the DILP.

Table 7.2: Learning characteristics of Generation Y and the implications for the DILP

Learning characteristics	Applications in the DILP
Active students	Students participated in the active learning process by, for example, searching on live databases and navigating through the DILP.
Experience-based	Students bring prior educational experiences to a learning situation, for example computer experience. This experience assists the students in working through the DILP.
Hands-on	Skills are acquired through hands-on experiences. The DILP supplies students with hands-on experiences, for example: students should compile a search strategy and then do a search using various search engines.
Task-centred	Generation Y students are more active in learning if they perform tasks. The DILP provides them with various tasks, for

Learning characteristics	Applications in the DILP
	instance to compile an outline for an assignment.
Problem-centred	The learning process is enhanced when students can focus on dealing with problems. The DILP presents students with problems, for example assisting a character named Sipho in defining and narrowing down a topic for an assignment.
Solution-driven	The DILP simulates a problem for which the student must find a solution, for example to assist the character Sipho in compiling a quotation and bibliographic reference for a digital book.
Value-driven	Students from Generation Y need to know why they should learn something before undertaking to learn it. The DILP therefore supplies them with an introduction to the DILP and why it is important for them to become digitally information literate.
Skill-seeking	These students seek out the attainment of new skills. By reading the introduction they will realise that the DILP can supply them with new skills.
Self-directing	These students perceive themselves to be independent.The DILP can be completed independently in their own time.

Learning characteristics	Applications in the DILP
External and internal motivation	Generation Y students are often motivated, externally and internally. Recognition is given to them in the DILP by supplying message boxes in the quizzes, with comments such as, ‘’Well done!’’. The training librarian can also issue certificates after completion of the DILP.

Learning style preferences were also addressed in the DILP, by including the following:

- **Active learning**: instructing the student to do a brainstorming activity
- **Kinaesthetic learning**: students search *via* the Web for a digital article from a journal; they can go to the site and download the article, therefore ‘’moving around and handling objects’’
- **Visual learning style**: using images, for example video clips to instruct the students on how to use the DILP
- **Holistic learning**: **balance** between various learning emphases, for example individual and group learning; **inclusion** of students from different races and with different abilities; **connection** – the student should be able to make a connection between a digital information need and the Web with its digital information sources
- **Real-world analogies and elaboration strategies**: the students, for example, assist a character, named Sipho, in doing his assignment; the assignment simulates a realistic assignment; elaboration strategies are addressed in instructing the students to do a brainstorming activity
- **Ludic behaviour**: the DILP contains entertaining activities
- **Customisation**: the DILP is self-paced and presents students with customised South African products, for example the Sunday Times Web site.

The **expectations** of Generation Y were also addressed. The DILP provides them, for instance, with constructive feedback by giving the answers to the quizzes immediately; there are clearly delegated assignments and flexibility in scheduling as they can complete the DILP in their own time.

7.2.2 Criteria, characteristics and presentation of a model ILP

The research established the **criteria, characteristics** and the **presentation** of a model ILP, in order to apply them to the DILP. No former criteria, characteristics and presentation methods existed for a DILP.

The following **criteria** were highlighted in the literature review:

- Orientation (the student situates himself/herself in the world of information and he/she can then focus his/her topic for an assignment).
- Interaction (there is interaction between the student and the information source).
- Internalisation (the student makes the information part of himself/herself; he/she is able to produce, for example, an assignment – by synthesising the information).

The identified **characteristics** of a model ILP are:

- A mission statement
- Goals and objectives
- Andragogy and student-centred learning
- Assessment.

Their implications for the ILP are indicated in Table 7.3.

Table 7.3: Characteristics of a model ILP and the implications for the DILP

Characteristic	Implication
Mission statement	Construct a mission statement that describes the overall purpose of the ILP, defines information literacy and gives possible benefits.
Goals and objectives	Reflect what the student should learn, for example: to articulate and focus on an information need, the student should be able to refine a topic, explore general information sources to become familiar with a topic and refine the focus of an information need.
Andragogy and student-centred learning	Most students are adults. This implies student centred learning and focusing on working, both in groups and individually, to explore problems and find solutions.
Assessment	Measuring student learning by using, for example, quizzes.

After establishing the criteria and characteristics of the ILP, it must be **presented** in some physical format. The following paper-based and electronic formats were identified in the literature:

- Manuals
- Hand-outs
- Stiffy disks and CD-ROMs
- Slide presentations
- Videos.

7.2.3 Criteria, characteristics and presentation of a DILP

As no former criteria, characteristics and presentation methods for a DILP existed, the **criteria, characteristics** and the **presentation** of a model ILP have been applied to the DILP.

The **criteria** are:

- Orientation
- Interaction
- Internalisation.

Table 7.4 explains how the above-mentioned are applied to the DILP.

Table 7.4: Criteria and their application to the DILP

Criteria	Application to the DILP
Orientation	The student situates himself in the world of digital information by • defining a topic. • selecting main concepts. • identifying keywords. • understanding that there is a range of digital information sources.
Interaction	The student interacts with digital information sources in the following way: • Choose from a range of appropriate digital information sources, for example e-books, e-journals, *etcetera* • Construct search strategies • Carry out a search

Criteria	Application to the DILP
	• Retrieve digital information • Cite and quote digital information • Appropriate understanding of copyright and avoiding plagiarism • Keeping the issues of currency, authority, *etcetera* in mind.
Internalisation	The DILP assists the student in • comparing and evaluating digital information and its sources. • organising, using and communicating digital information. • synthesising the digital information.

After the criteria were established, the **characteristics** of a DILP had been identified. These are listed in Table 7.5.

Table 7.5: Characteristics and their applications to the DILP

Characteristics	Application of the characteristics to the DILP	Example from the DILP
Mission statement	This was incorporated into a page explaining digital information literacy.	To be *digital information literate,* you need to know *why, when* and *how* to use these sources and formats and think critically about the digital information they provide. You won't become *digital information literate* overnight. Just as with speaking and writing skills, your abilities will

Characteristics	Application of the characteristics to the DILP	Example from the DILP
		improve over time as you gain expertise in the topics you choose to investigate and as you practice searching for, selecting and evaluating the digital information.
Standards and outcomes	The content of the units was based on the standards and outcomes.	**Standard 1 = Unit 1** The program will assist the student in recognising the need for digital information and determining the nature and extent of the digital information need. **Outcomes** The student can • understand the need for digital information. • when given a topic, define and refine the topic. • identify key concepts and terms. • explore general digital information sources to increase familiarity with the topic.
Andragogy	The DILP focuses on student-centred	Prompt feedback, for example,

Characteristics	Application of the characteristics to the DILP	Example from the DILP
	methods; they are • asynchronous communication. • co-operation among students. • active learning techniques. • prompt feedback. • technologies to complete tasks. • cognitive skills development. • flexible structure of program.	was achieved by using e-mail, quizzes and activities that test knowledge, with immediate responses.
Assessment	The DILP used selected response, cognitive and portfolio assessment.	An example of selected response assessment is the following check box question from Unit 1: **Defining your topic…** ☐ Is only done when the assignment topic tells you to define the topic ☐ Is a waste of time – get in and write! ☐ Is only needed when there is a lot of technical jargon ☐ Should always be done to assist you in refining your topic.

Following the criteria and characteristics, is the **presentation** of the DILP.

7.2.4 Presentation of the DILP

The DILP is **presented** on a Web published CD, containing an online interactive Web based tutorial. Figure 7.2 depicts the CD.

Figure 7.2: The DILP Web published CD

7.2.5 Design of the DILP

The design of the DILP took place in a Web based environment and significant factors for a Web based environment were identified from the literature to apply during the design of the DILP.

The factors were:

- Interactivity
- Site architecture

- Navigation features
- Principles of design
- Elements of design
- Incorporating media.

These factors are discussed briefly.

As a Web environment lends itself to **interactivity**, the following were used to ensure interactivity:

- Questions, quizzes (such as multiple-choice) and self-tests with immediate feedback, using forms. A question, for example, is posed to the student, a fill-in-box is provided to type and submit the answer, the correct answer can then be viewed
- Graphics and animations which aid in visual cognition, interest and interactivity (Hegarty, Quinlan & Lynch, 2004)
- Real-time database searches
- Simulations, to present real-world environments, for example an instruction to the student to assist a peer with an assignment.

A flexible path structure was chosen for the **site architecture**. This means that the student can view the content in any order or sequence, depending on his/her choice. The units are available from the home page and other parts of the site. The student can work through them systematically or skip sections and go directly to the units he/she sees as relevant, therefore controlling his/her learning environment.

Navigation features included in the DILP are:

- A logo (placed on all the pages of the various units to make the program recognisable)

- Hierarchical menus (units are expanded when the mouse pointer is clicked on the content)
- Local navigation (forward and backward arrows are used)
- A site map (a list of all the units is available from every page in the DILP)
- Navigational buttons (hyperlinks, which change colours are used)
- External links (links to other URLs are used, however, in a limited way).

The following **principles of design** were applied during the design phase:

- Economy of space
- Unity and variety
- Emphasis
- Balance and white space.

Table 7.6 expands on the principles of design.

Table 7.6: Principles of design

Principles	Application to the DILP
Economy of space	Elements on the pages are limited and placed consistently.
Unity and variety	Pages are consistent in their appearance.
Emphasis	Headings and graphics are used to attract attention and are always placed in the middle of the page.
Balance and white space	There is enough white space on the pages, which prevents tension and anxiety when the pages are read.

The following **elements of design** were incorporated:

- Colours and backgrounds (Web safe blue, green and black on a white background)
- Typography (sansserif Arial in 10 and 12-point type)
- Readability (using – for example – lists, text length, page layout and correct spelling to improve readability)
- User control (the student can use the outlines of the units to access any part of unit and access any unit from any page in the site)
- Map or table of contents (a site map and a home page were created).

The following **media** were **incorporated** to make the DILP more interesting and inviting:

- Graphics
- Sound
- Video
- Animation.

The **learner levels** catered for were students in the first to third-year level of tertiary education, as the majority (60%) of students in South Africa fall into the first to third-year level of higher education.

7.2.6 Development of the DILP

In developing the DILP, attention was given to the following:

- Deciding on the content of the DILP
- Organising the content of the DILP (using information maps and storyboards)
- Authoring

- Additions and changes to the original content
- Changes in the design of the DILP
- Technical requirements for the authoring of the DILP
- Technical requirements for using the DILP
- Checklists, ensuring that the guidelines and criteria established in the previous chapters were met
- Evaluating and testing of the prototype
- Production of the DILP.

7.2.7 Outcomes of the evaluation and testing of the prototype

As mentioned in Chapter 6, section 6.10, evaluation was done in order to gather information to synthesise ideas for recommendations and further improvement of the DILP.

The responses of the students and interpretations of these are tabulated in Table 7.7.

Table 7.7: Responses of students, interpretations and actions taken

Responses and interpretations	Actions taken
All the students found that the content covered was useful.	No changes were made to the content.
The majority of students felt that an improvement was necessary where the instructions were concerned.	Instructions were added and altered in the HELP function of the DILP.
All the students agreed that the objectives and outcomes were clear.	These were not altered in the DILP.
All the students agreed that the	None of the presentation techniques were

Responses and interpretations	Actions taken
presentation techniques were creative.	changed.
40% of the students indicated that the variety of media used – to present the content – was not adequate.	No changes were made due to the fact the students could not experience the full range of media, as there were restrictions placed on some of the computers used in the laboratory where the evaluation took place.
20% of the students did not find the screens visually pleasing.	It was decided not to alter any of the screens, bearing in mind that a small difference in opinion was deemed to be acceptable.
20% of the students felt that the font was not easily readable.	The font size or type was not changed. According to research, the sansserif Arial is one of the easier fonts to read on-screen and it is also not an uncommon typeface. The font size was also not changed to a bigger 12-point type, because of the limited space in the browser window.
The majority the students found the navigation options user-friendly.	Backward arrows – to improve the local navigation – were added. Information on how to jump to other units or how to find one's way out of the program was also added to the HELP page of the DILP.

Responses from students indicated that the average time taken to complete the program is one hour 36 minutes.

It is evident from the above that the students were satisfied with the program. However, certain changes – as indicated – were made to the DILP. It can therefore be concluded that the design and development of the program were efficient.

The following table indicates the responses that were given about **how the program can be improved** and the changes that were subsequently made to the DILP.

Table 7.8: How the program can be improved

Response	Changes made to the DILP
''I don't think it needs any improvement cause [sic] it's fun and challenging and I enjoyed every moment. ''	No changes were made.
''The instructions for the quizzes were not very clear.''	**The instructions changed from:** The final section of this module is a 9 question quiz. After reading the question, choose your answer and click the submit button. Occasionally the question is a bit longer than the frame and you might have to scroll down to find the submit button. The DILP will then display a response to your answer. Read the response, then click the link to the next question. You can take the quiz as many times as you wish.

Response	Changes made to the DILP
	to After reading the question, choose your answer and click the button next to it. We will then display a response to your answer. Read the response and then go to the next question.
''Increase the font size of the glossary title.''	The font size of the glossary title was changed from a 10-point to a 12-point type for body text.
'' … with more pictures.''	The Sipho character with the speech bubble was added to all the units. For example: 
''Allow the user to navigate backwards.''	Backward arrows (⬅) were added to all the pages.
''The program was awesome, it does not need improvement, but I think more information on computer viruses will be necessary.''	No additional information about computer viruses was added, as it was not possible to establish what additional information about computer viruses the student really wanted.

7.3 Recommendations

The following recommendations are made with regard to the DILP.

7.3.1 Evaluating the DILP

Once the DILP has been implemented at academic libraries, it should also be **evaluated** by those libraries. This would be the summative evaluation, which refers to the evaluation that takes place after design, development and implementation (Brandt, 2002:109).

After installation, the following process is recommended for the evaluation:

- Conduct the summative evaluation
- Revise the DILP
- Produce new materials or add new materials
- Re-distribute the DILP
- Maintain the DILP (Carliner, 1999:63).

The evaluation can be done through e-mail feedback options which can be built into the DILP itself. Formal evaluation forms could also be distributed to the students for completion (Germain & Bobish, 2002:83).

Pausch and Popp (1997) suggest that a full program evaluation should be done, as most studies report only on the evaluation of a particular part of a program.

Assessment of the following feasibility factors should also be conducted before revision of the program is considered:

- Financial feasibility
- Access to computers
- Previous experience with online learning (Carliner, 1999:66-67)
- Previous experience with computers in general (if users are computer illiterate, a computer literacy training course should be offered first).

Another way of improving the program is by evaluating student development.

7.3.2 Evaluating student development

Wallace, Shorten and Crookes (2000:486) suggest that an academic library should also determine the extent of student development with regard to digital information literacy skills by using pre- and post-program questionnaires.

These questionnaires should assess their digital information literacy skills. Assessment should be done before and after the students completed the program.

Wallace et al. (2000:486) suggest that the following should be included in the questionnaires – as a method to determine student performance on skills:

- Selecting a suitable command on a database
- Responding to the command by locating the appropriate item
- Selecting an appropriate source of information on a new topic
- Constructing citations and a bibliography in the Harvard reference format from information used in an assignment.

In addition to the above-mentioned, Pausch and Popp (1997) suggest that cognitive skills for analysis, synthesis and the evaluation of digital information should also form the basis for the assessment of student development.

This can be done by using tests, where the questions test the students' cognitive, synthesis and evaluating skills. Again, these tests should be given to the students who completed the program.

7.3.3 Adding a computerised mentor

In Chapter 2, section 2.3.8. Importance of mentors, it is stated that Generation Y has a need for mentors.

A mentor can be built into the program by allowing the students to choose a computerised or human mentor to work with. The mentor in the computerised format can be a cartoon character with voice output, instead of a human mentor – the librarian.

This would, however, incur costs and the skills of a cartoonist and/or video producer.

7.3.4 Digital certification

By giving a digital certificate once the student has completed the DILP, the student will be rewarded. In Chapter 2, section 2.6 Expectations of Generation Y, it is pointed out that they expect to be rewarded when they have completed a task.

7.3.5 *Model of instruction for the DILP*

The model of instruction is how the program will be delivered to the students, for example

- course-related instruction.
- Web based instruction.
- connected with general education credit courses (curriculum-integrated).
- as part of library instruction (Jacobson & Mark, 2000:258-261).

As the DILP is already designed in a Web based environment, it is suggested that the DILP is curriculum-integrated as a subject for graduation.

To achieve this, Wallace et al. (2000:485) suggest that the program should be integrated with current programmes at higher education institutions by making the information relevant to subject content through integration of learning activities, assessment tasks and course objectives.

The advantages of the combination of the models are that

- students treat the program more seriously (as they need it to graduate).
- digital information literacy forms part of a successful university experience.
- students benefit from the depth and breadth of a program that is presented over a number of units, completed in the student's own time.
- the program is self-paced, interactive and computer-based (Jacobson & Mark, 2000:259-261).

To accomplish the above-mentioned, it is important to get the institution of higher education enthusiastic about the program, in order to convince them to incorporate the program into their curriculum. The program can then be customised to suit the various disciplines such as tourism, accounting, engineering, *etcetera.*

7.3.6 Adding the DILP to a Web based educational environment

According to the University of Massachusetts (2002), a Web based environment is an integrated set of course tools that provides functions for:

- Information distribution
- Communication

- Student assessment
- Class management.

An example of such an environment is Web Course Tools (WebCT). The DILP was developed in FrontPage and this allows for the program to be used in this environment.

The following communication and student assessment tools can therefore be added:

- Asynchronous communication using bulletin boards
- Synchronous communication using chat rooms
- Quizzes with auto marking
- Paragraph quizzes and self-tests
- Student progress and tracking
- Surveys.

Using the class management tool, the quizzes in the DILP can be marked online and student participation can be tracked.

Large numbers of students could also be accommodated using WebCT. Another advantage of using WebCT is that it could assist in collecting statistics, for example how many students used DILP, how many students took the quizzes and generally how they answered them. A page could be added where students could comment on the most important thing they have learned from this program – this could help the library to discover what might still be lacking.

7.3.7 Personalising the DILP

As the design of the DILP is flexible, the units could be modified – in relation to the subjects offered by a specific institution of higher education. Subject specific

content could be added, making the information in the DILP more relevant through the integration of learning activities, assessment tasks and course objectives of the specific subject, for example nursing or agriculture.

The DILP could also be adjusted by adding external links to the specific library's own online catalogues, databases and other electronic materials such as valuable collections of text, images and sounds.

Each library using the DILP should also change the hyperlink in Unit 2: Databases, to their own library's home page or page which contains a list of all their databases, rather than using the current hyperlink, which links to the databases of Tshwane University of Technology. This will also prevent the problem of generating more users than the specific Web server might be able to handle.

The DILP could be posted on the library's home page, just like libraries post their portion of electronic information resources on their home pages (Wilson, 1997). The program could also be integrated with the current instruction programmes of academic libraries.

The text of the DILP can be translated into other languages, creating additional versions of the DILP.

It is also suggested that a registration function should be incorporated, for the students to be authenticated with a username and password. This will be achieved using WebCT, as seen in section 7.3.6 Adding the DILP to a Web based educational environment.

An initial session or two with the students could be useful for discussing principles underlying the DILP, the units, related activities, *etcetera*. Bagnole and Miller (2003) state that the human face can demystify technology.

7.3.8 Technical requirements

A list of the technical requirements for using the DILP is included to ensure that the user and reader of this dissertation – and of the DILP – will have the specified requirements in order to use the DILP.

Students on campus may have access to fast Internet connections. However, when connecting from home or from other networks, access to the DILP may be slower and the technical requirements will enable a faster connection.

Table 7.9: Technical software and hardware requirements for using the DILP

Hardware	☑/☒	Description
Processor	☑	Pentuim III 600MHz
Memory	☑	128 MB
Hard drive	☑	However, it is not necessary to install the DILP on hard drive as the program can run from the CD-ROM drive
Graphics adaptor	☑	Screen resolution: 800 x 600 pixels; colour quality: medium - 16 bit
Monitor	☑	14” screen
Zip drive	☒	
CD or DVD drive	☑	52X or 56X
Telecommunications	☑	Internet connection
Scanner	☒	
Printer	☑	
Digital camera	☒	
Speakers	☑	
Other	☑	Internet Information Server (IIS) if the DILP should run on server

Software	☑/☒	Description
Operating system	☑	Microsoft Windows 98, recommended: Windows 2000 or XP
Office software	☒	
Authoring system	☒	
Graphics software	☒	
Photography software	☒	
Testing software	☒	
Music software	☒	
Video software	☑	Microsoft Windows Media Player 10 (download from www.microsoft.com) or Macromedia Flash Player 7 (download from http://www.macromedia.com).
Browser	☑	Internet Explorer 6
Other	☑	Anti-virus software; FrontPage extensions 2002 (if the DILP should run from a server)

7.3.9 Maintenance

The content of the DILP should be maintained and updated. The hyperlinks should, for example, be checked regularly, to prevent the students from getting the following message: ‘‘The requested URL could not be retrieved’’.

Problems could be experienced if new content/scripts need to be added or if errors occur, as one might have to wait for the computer systems staff to fix the problem or implement these changes.

7.3.10 Possible additions to the DILP

Using **Web coding tools**, it is possible to add the following to DILP:

- The assessment of student navigation patterns and detection of problems and successes (as users are authenticated with a username and password)
- Monitoring a student's progress through the different units – if a student is having difficulty answering a certain question, the program can redirect the student to the section of the specific unit to review the troublesome concept . The program therefore responds to user input
- Streaming media, which include video, audio and other multimedia applications – allowing the student to play files without waiting for complete download. This means that while the student is watching the beginning of a video, for instance, the rest of the file is downloading
- Video-based instruction without broadband Web access using streaming (Germain & Bobish, 2002:86-87).

More **Flash-based interactions** and intellectually stimulating experiences could be added. However, they require high-speed connections to work at an optimal level. This type of interactivity will make the program more dynamic (Fowler & Dupuis, 2000). Computer viruses, however, place a restriction on the use of interactivity.

Content could be more tailored to each individual's competencies (Fowler & Dupuis, 2000) – by adjusting the content dynamically to the student's level of prior knowledge. Technology is now available to create a program that can adapt to a student's prior knowledge. Students can take a pre-test to determine what they already know and a specific unit is then generated that teaches them only what they want to learn.

The **quizzes are not marked**, as there is no way to determine who is actually answering the questions. When the DILP is used in a Web based environment –

such as WebCT – this problem will be overcome by allowing the student to register as a user and he/she is then authenticated with a username and password.

7.4 Future research

- The viability of establishing a digital information literacy program in other library types, for example community libraries, school libraries, *etcetera,* within the South African context, could be investigated.
- Within the context of Generation Y, a DILP can be designed and developed for the previously disadvantaged students at academic libraries in South Africa.
- Ascertain the effectiveness of the DILP and determine to what extent it improves digital information literacy skills.
- Summative/formative or qualitative/quantitative assessment of digital information literacy in institutions of higher education could be undertaken.

7.5 Concluding comment

To reiterate the Illinois Mathematics and Science Academy's statement (2002) – digital information is beginning to rival print as the primary format for information. Only 2% of new information published today appears in print format.

As a result, digital information literacy – the ability to access, evaluate and use the digital information – is fast becoming a skill as essential as traditional information literacy has been. In the 21st century, digital information enriches the lives of students – personally, educationally, socially and economically. Those

without the skills to use digital information will become increasingly disadvantaged.

The DILP should therefore become increasingly important in academic libraries, and also a very important resource for students from Generation Y.

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