THE EVALUATION OF A DIGITAL INFORMATION LITERACY PROGRAM

by

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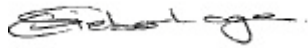
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I declare that **The evaluation of a digital information literacy program** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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Abstract

The thesis reports on the evaluation of a digital information literacy program (DILP) to determine the program's effectiveness in enhancing students' digital information literacy skills. The program was originally designed and developed for the South African student, as member of Generation Y, but was adapted to suit the demographics and characteristics of Generation Z. New learning technologies were incorporated to enhance students' learning experience.

One of the characteristics of information literacy programs that illustrate best practice is the evaluation of the program itself to judge it's effectiveness and validate the program as a learning tool.

A review of the literature confirmed the paucity of the evaluation of such programs using assessment of student learning through outcomes assessment instruments, based on information literacy competency standards, designed with proven validity and reliability. The literature review found *no evidence* of the evaluation of the effectiveness of such programs through meaningful assessment of student learning using outcomes assessment in South Africa. For these reasons, the evaluation of the DILP was undertaken.

To evaluate the effectiveness of the DILP, a non-randomised quasi-experimental research design, focusing on a single-group pre-test/post-test design which incorporated a combined quantitative and qualitative research approach was used. The primary research instrument was a pre- and post-test. A group of students, belonging to Generation Y and Z, completed a pre-test, worked through the DILP and completed a post-test. Telephonic and e-mail interviews were used to collect further data.

The statistical analysis is presented by using descriptive statistics (stacked bar charts for the quantitative data and pie charts for the qualitative data). Inferential statistics were used to reach conclusions beyond the immediate data presented in the charts. The final step was to judge the overall effectiveness of the DILP. The difference

between the means was statistically significant, indicating that the DILP was effective in enhancing the digital information literacy skills of students.

Based on this research, additional research could be the evaluation of a DILP designed specifically for "digital natives"; the development of online outcomes assessment instruments for web-based tutorials with proven validity and reliability and research in the area of integrating emerging learning technologies with such programs, evaluating their effectiveness.

Key terms

Program evaluation; Evaluation research; Summative evaluation; Digital information literacy; Digital information literacy program; Academic libraries; Students; Generation Y; Generation Z; Learning technologies; Student learning; Assessment; Outcomes assessment; Higher education institutions.

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List of acronyms

ACRL	Association of College and Research Libraries
ANZIIL	Australian and New Zealand Institute for Information Literacy
CAUL	Council of Australian University Librarians
CD-ROM	Compact Disc Read-Only Memory
DILP	Digital Information Literacy Program
GIF	Graphic Interchange Format
IFLA	International Federation of Library Associations and Institutions
ILCoPSU	Information Literacy Community of Practice at Staffordshire University
ILL	Institute for Information Literacy
JISC	Joint Information Systems Committee
LIS	Library and Information Services
MPEG	Moving Picture Experts Group
NFIL	National Forum on Information Literacy
OPAC	Online Public Access Catalogue
RSS	Real Simple Syndication
SAILS	Standardized Assessment of Information Library Skills
SCONUL	Society of College, National and University Libraries
SMS	Short Message Service
TUT	Tshwane University of Technology
UCLA	University of California, Los Angeles
UNESCO	United Nations Educational, Scientific and Cultural Organization

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, 2011?: Academic Library).

Assessment

Assessment is to determine a rate or amount and is used as an activity to measure student learning (Hodnett, 2001).

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 collection of instructions, via a computer, that will aid the student in identifying digital information which will address a particular information need and will assist in locating, evaluating, effectively organising and ethically using the digital information formats.

Evaluation

Evaluation is to determine significance or worth or judging the effectiveness or worth of educational programs (Hodnett, 2001).

Evaluation research

Evaluation research has as its primary goal not the discovery of knowledge but rather the testing of the application of knowledge within a specific program. The two general types of evaluation research are summative and formative evaluation (Powell & Connaway, 2004:55).

Generation Y

Generation Y are those people who were born between 1978 and 1990 and their ages, in 2010, range between 20 and 32 (Pierce, 2007).

Generation Z

Generation Z comprises anyone born in or after 1990 (Geck, 2006). Their age in 2010, is 20 years or younger.

Higher education institution

According to the Higher Education Act (2007), a higher education institution "means any institution that provides higher education on a full-time, part-time or distance basis."

Learning technologies

Learning technologies encompass information and instructional technology, as well as telecommunications tools, applications and systems that support learning (Educause, 2011).

Outcomes assessment

Outcomes assessment refers to the activity of investigating the effectiveness of a learning intervention program in producing change among library users (Hernon & Dugan, 2002:80)

Program evaluation

The systematic collection of information about the activities, characteristics and outcomes of programs to make judgements about the program, improve program effectiveness and/or inform decisions about future programming (Patton, 1997:23).

Student

Mothata (2000:166) defines a student as follows: "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."

Student learning

Student learning is defined as the acquisition of knowledge and skills by a person studying at an institution of higher learning.

Summative evaluation

Research designed to determine the extent to which a particular intervention has met its stated objectives (Bless & Higson-Smith, 2000:157). This type of evaluation is concerned with a program's overall effectiveness (Center for Program Evaluation and Performance Measurement, 2011?: Summative evaluation).

Chapter 1

Introduction

This thesis reports on the evaluation of a digital information literacy program (DILP). The study focuses on the program, designed and developed for the South African student as member of Generation Y and Z, as well as the integration of new learning technologies with the DILP. Attention is given to the evaluation initiatives of academic libraries, with specific reference to the evaluation of the effectiveness of digital information literacy programs. The testing of the DILP, along with the development of an outcomes assessment instrument, are discussed. The analyses and interpretation of the data collected as part of this research study are also presented.

The current chapter introduces the research topic by explaining the background to the study, the statement of the problem and research objectives. This chapter also highlights the significance of the research, research approach, methodology and design.

1.1   Background

> … 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 … Those without the skills to use digital information will become increasingly disadvantaged (21st Century Information Fluency, 2011).

It is a worldwide trend that academic libraries provide information literacy instruction (Kasowitz-Scheer & Pasqualoni, 2002). Thompson (2002) agrees by stating that:

> … during the later decades of the twentieth century, an information explosion,

fueled 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 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 & Texeira, 2003:312). This implies that a new set of skills, which allows a student to identify, locate, evaluate and use digital information resources, is required (21st Century Information Fluency, 2011).

According to Underwood (2002:5), a pilot project in information literacy – the INFOLIT Project – was established in 1995. Since then, there have been efforts to establish information literacy programs at higher education institutions in South Africa. These programs were, however, compiled by the libraries to the best of their ability and not necessarily according to international criteria for information literacy programs.

One should also remember that a major part of the academic libraries' sources is in digital format and not necessarily in printed format. Electronic resource portals at academic libraries provide access to thousands of databases, e-books, e-journals, e-dictionaries, e-encyclopaedias, e-newspapers and e-directories. Consequently, academic libraries have to offer digital information literacy programs, and not necessarily information literacy programs, to the students.

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

A digital information literacy program, named the DILP, was consequently designed and developed as part of the researcher's Magister Technologiae degree in Library and Information Studies in 2006. The DILP was designed and developed to enhance digital information literacy skills of students. A formative evaluation was done during the design and development of the DILP. The design and development process is attached in Appendix A, Design and development of the DILP.

After the design and development was completed, the program was issued in CD-ROM format and obtained by the Nelspruit Distance Campus Library of the Tshwane University of Technology. The training librarian can use the units of the DILP for digital information literacy training sessions, offered to some of the 1756 students of this campus. Students can also improve their digital information literacy skills by working through the DILP on their own, if they so wish.

According to the Association of College and Research Libraries' (ACRL) Institute for Information Literacy (2011), one of the characteristics of information literacy programs that illustrates best practice is the evaluation of the program itself. Mouton (2001b:572) suggests that program evaluation should be carried out, to establish the relative success or not of an intervention. The DILP is an example of such an intervention.

Stewart, Waight, Norwood and Ezell (2004) state that programs have to be evaluated, as the evaluation can be used to improve services and to validate a particular program as a learning tool. For these reasons, the evaluation of the DILP was undertaken.

1.2 Statement of the problem

The evaluation of educational programs or instruction and products are often set aside or discarded because of other considerations and it is not unusual that such programs are not evaluated in any fashion (Sharpless Smith, 2010:177). This is also reiterated by other authors in the field of information literacy instruction, for instance,

- Poole (2000), Barclay (1993) and Riggs (1997) are of the opinion that important

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but limited evaluative work being done at institutions is underrepresented in the academic library literature.

- Davidson, McMillen and Maughan (2002:98) state that evaluations of programs are not common.
- Walsh (2009:19) mentions that insufficient research has been conducted on whether information literacy programs are effective.
- Tronstad, Phillips, Garcia and Harlow (2009:54) agree that comprehensive evaluation of online information literacy programs is sparse.

More and more higher education institutions are furthermore incorporating information literacy programs and the need to develop evaluation methods and tools to assess their impact is therefore arising. "Evaluation has become an extremely important topic in the field of information literacy, and it should also become a priority line of research" (García-Quismondo, 2010:34).

The evaluation of programs can be done by doing evaluation research. Powell (2006:105) states that the primary goal of evaluation research is to assess the effectiveness of a program.

The following international bodies and associations in various countries proposed evaluation models, some of which have been implemented by various higher education institutions and countries (García-Quismondo, 2010:29):

- the International Federation of Library Associations and Institutions (IFLA)
- United Nations Educational, Scientific and Cultural Organization (UNESCO)
- the ACRL Institute for Information Literacy (ILL) in the United States
- the National Forum on Information Literacy (NFIL) in the United States
- the Information Literacy Community of Practice at Staffordshire University (ILCoPSU)
- the Society of College, National and University Libraries (SCONUL) in the United Kingdom and Ireland

- the Joint Information Systems Committee (JISC) in the United Kingdom
- NordINFOLIT in Scandinavia
- the Australian and New Zealand Institute for Information Literacy (ANZIIL).

In South Africa, the Library and Information Services (LIS) Transformation Charter (Department of Arts and Culture & National Council for Library and Information Service, 2009:31) merely recommends the creation of an institutional information literacy policy leading to an action plan which will prompt higher education institutions to recognise their responsibility of ensuring that graduates enter the workplace with the requisite information literacy skills. There is, however, no recommendation for an evaluation model.

After an extensive literature search on various national and international databases in April 2008 and February 2011, it became evident that limited research has been done on the evaluation of digital information literacy programs such as the DILP. The following South African databases were searched:

- Current and Completed Research Projects in South Africa
- SACat
- SANB
- ISAP
- Navtech
- UCTD
- SA ePublications
- Kovsidex.

International databases were also searched, namely:

- ProQuest Dissertations and Theses
- Proquest Education Journals
- ISI Web of Knowledge

- Australasian Digital Theses Program

- Emerald

- EBSCO

- ScienceDirect

- Networked Digital Library of Theses and Dissertations (NDLTD)

- Book Data.

Furthermore, library instruction programs consisting of bibliographic instruction and user education/instruction evolved in the 1990s into information and digital information literacy programs, such as the DILP (Lloyd & Williamson, 2008). The evaluation of these library instruction programs was mostly concerned with how librarians performed as teachers, what the students gained from the instruction in terms of understanding how to find information in libraries, how well students compiled bibliographies and used references in assignments as well as students' opinions of these programs (Rader, 2000).

Shinkins (1995) explains that evaluation can either be formative or summative in nature. Formative evaluation is mainly used to determine how students perceive programs and the library and how comfortable they feel to do research.

Formative evaluation furthermore assists in the collection of data to provide insight into revising instructional material in order to make it more efficient. Flaspohler (2003) reports that mainly formative evaluation was undertaken previously – mostly in the United States of America – with regard to information literacy programs. A formative evaluation was already carried out during the design and development of the DILP, whereafter revisions and the necessary improvements were made.

In applying program evaluation, the research will therefore focus on summative evaluation which is a component of program evaluation (De Vos, 2002b:377). In contrast to formative evaluation, a summative evaluation can determine the program's worth and also judge the effectiveness of the program (Sharpless Smith, 2010:179).

1.2.1 Problem formulation

In 1998, the ACRL Task Force on Academic Library Outcomes Assessment Report called for information literacy standards based on outcomes assessment. Since the ACRL produced the Information Literacy Competency Standards for Higher Education in 2000, libraries began to evaluate the effectiveness of information literacy programs in terms of students' ability to demonstrate the desired information literacy skills and knowledge after working through programs.

A review of the literature, however, found little evidence that evaluation of library instruction programs includes meaningful assessment of student learning, for example, through outcomes assessment, to determine the effectiveness of programs (Applegate, 2006:326 and McMillen & Deitering, 2007:62). It was therefore considered important to conduct an outcomes assessment of the DILP to determine the effectiveness of the program and to judge its worth as an educational program.

1.3 Scope and objectives

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

1.3.1 Aim of the research

According to Sacchanand and Jaroenpuntaruk (2006), there are two ways of evaluating the effectiveness of a program: firstly, to evaluate the students' learning through pre- and post-tests and, secondly, to evaluate the system to obtain feedback from the target users that can be used to improve the effectiveness of the program in terms of

- Instructional quality
- Content validity
- Clarity of instructional content

- Explanation and presentation of content
- Visual design
- User interface and multimedia design
- Audience consideration.

During the formative evaluation of the DILP in 2006, it was already evaluated for its effectiveness in terms of the clarity of instructional content, instructional quality, explanation and presentation of content, visual design, audience consideration and user interface and multimedia design, but was not evaluated for its effectiveness by measuring student learning using pre- and post-tests. As a result, the aim of this research was thus to focus on measuring students' learning using outcomes assessment.

Benigno and Trentin (2000:259) state that it is complex to find criteria with which to evaluate students' learning. It was therefore important to start the process of establishing methods for measuring students' learning. According to Stewart *et al.* (2004:5), the outcomes of the programs can be assessed to indicate how well the instructional material has been mastered.

In 2000, the Information Literacy Competency Standards for Higher Education were created by the ACRL (2000) and still serve as the benchmark for information literacy programs. These information literacy standards can be applied to assist with the identification of appropriate outcomes and to design outcomes assessment instruments.

In 2001, the Council of Australian University Librarians (CAUL) adopted the ACRL standards and added two more standards to the five of the ACRL. For each standard there are listed outcomes and these can be used to design outcomes assessment instruments. The various units of the DILP were written according to a combination of these standards, since CAUL includes two more standards, namely that the information literate person should be able to

- classify, manipulate and redraft the information collected or generated.
- recognise lifelong learning.

Outcomes of the standards were applied in the creation of the content, exercises and quizzes for the DILP. The standards and selected outcomes from the ACRL and CAUL as well as the specific outcomes, as set out in the units of the DILP, are depicted in Appendix B, Standards, outcomes and DILP specific outcomes.

Cacha and Abdullah (2008:209) state that these outcomes serve as guidelines for the development of assessment instruments and Emmett and Emde (2007:211) point out that the outcomes mentioned in the standards should be used in the construction of assessment questions. Kruse (2004) and Hoffman (2002) further explain that, in order to measure results, one should ensure that the questions in the pre- and post-test are set according to the outcomes. The questions for the pre- and post-test were therefore written according to the outcomes, as set out in the DILP, which were based on the outcomes of the ACRL and CAUL.

There are 21 outcomes which are set out in the different units of the DILP. The figures in Appendix E, Mapping of questions to standards and outcomes with evidence of validity, based on expert ratings of the items, illustrate how the questions were mapped to the ACRL, CAUL and DILP outcomes, with evidence of validity, based on expert ratings of the items.

In summary, the aim of the research was therefore to develop and utilise outcomes assessment methods in order to measure students' acquisition of digital information literacy skills and consequently determine the effectiveness of the program.

1.3.2 Research objectives

The objectives were sevenfold, namely to

- Identify the demographics and characteristics of Generation Z in order to incorporate this information in the existing DILP, therefore making the DILP applicable to and useful for both Generations Y and Z, since the DILP was originally designed and developed for Generation Y.

- Identify and incorporate new learning technologies in the existing DILP.

- Provide a historical outline of the evaluation initiatives by academic libraries, the evaluation of information literacy and digital information literacy programs and the evaluation of the effectiveness of digital information literacy programs using outcomes assessment.

- Develop an outcomes assessment instrument.

- Administer the instrument and analyse the quantitative data in order to determine the effectiveness of the program by measuring student learning.

- Conduct telephonic and e-mail interviews in cases where there was a negative change in students' ability to answer post-test questions, analyse the qualitative data to assess the program and the outcomes assessment instrument.

- Provide evidence of the effectiveness of the program and indicate how the program may be improved to be more effective in enhancing students' digital information literacy skills.

The overall objective is thus to carry out an outcomes assessment, using an outcomes assessment instrument, to get a complete picture of the program's effectiveness in enhancing students' digital information literacy skills.

1.3.3   Scope, limitations and exclusions

Stake (as quoted by Bennett, 2003:9) lists various dimensions of evaluation, namely:

- Formative - summative
- Formal - informal
- Case particular - generalisation
- Product - process
- Descriptive - judgemental
- Pre-ordinate - responsive
- Holistic - analytic
- Internal – external.

The research focused on summative evaluation, since this type of evaluation primarily seeks to gather information on the effectiveness of a program (Bennett, 2003:9).   The other dimensions do not allow for the gathering of this type information.   The pre-ordinate - responsive dimension, for instance, is concerned with "the extent to which the evaluation takes account of the concerns of those involved in the programme" (Bennett, 2003:11).

The limitations are explained in the following paragraph.

As mentioned in 1.3.1 *Aim of the research*, the effectiveness of the program can be determined by focusing on the evaluation of the students' learning or the effectiveness of the program in terms of

- Instructional quality
- Content validity
- Clarity of instructional content
- Explanation and presentation of content
- Visual design

- User interface and multimedia design

- Audience consideration.

The research was limited to students' learning only, as the literature review found little evidence of evaluation of information literacy instruction programs which includes meaningful assessment of student learning.

According to Powell and Connaway (2004:57), there are different approaches to evaluation, such as:

- Responsive evaluation

- Evaluation research

- Decision-oriented evaluation

- Goal-free oriented evaluation

- Naturalistic evaluation, and

- Professional judgement (Powell & Connaway, 2004:57).

These approaches can all be both summative and formative, except for evaluation research which is summative in nature. The others were therefore excluded.

1.3.4 Significance of the research

In his influential article, Barclay (1993) already pointed out that librarians need to evaluate library instruction programs as there is an increased demand for evaluation. As mentioned in section 1.2, Tronstad *et al.* (2009:54) state that comprehensive evaluation of online information literacy programs is sparse and Walsh (2009:19) mentions that insufficient research has been conducted on whether information literacy programs are effective.

Furthermore, a review of the literature confirmed the paucity of the evaluation of library instruction programs which includes meaningful assessment of student learning through

outcomes assessment. The literature also revealed the lack of outcomes assessment instruments which are based on information literacy competency standards and those designed with proven validity and reliability.

A review of the literature found *no evidence* of the evaluation of the effectiveness of information literacy programs or digital information literacy programs which includes meaningful assessment of student learning through outcomes assessment in South Africa.

This research study also aimed to determine the effectiveness of the program by incorporating new learning technologies with the DILP to make it useful to students from Generation Y and Z, whilst investigating their demographics and characteristics.

This research initiated the process of determining the methods for assessing the overall effectiveness of the DILP in aiding students' acquisition of digital information literacy skills. Academic libraries at higher education institutions can, in the end, implement the DILP and use the program to enhance the digital information literacy skills of their students.

1.4   Key theoretical concepts

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

1.4.1 Evaluation

"Evaluation is to determine significance or worth or judging the effectiveness or worth of educational programs" Hodnett (2001).

For the purpose of this study the educational program, the DILP, will be judged for its effectiveness and worth as an educational program.

1.4.2 Program evaluation

Patton (1997:23) provides the following definition of program evaluation:

> The systematic collection of information about the activities,
> characteristics and outcomes of programs to make judgements about the
> program, improve program effectiveness and/or inform decisions about future
> programming.

This study will therefore collect information using quantitative and qualitative methods to make a judgement about the DILP's effectiveness.

1.4.3 Evaluation research

According to Powell and Connaway (2004:55), evaluation research

> has as its primary goal not the discovery of knowledge but rather the testing of
> the application of knowledge within a specific program. The two general types of
> evaluation research are summative and formative evaluation.

The type of evaluation research used was a summative evaluation.

1.4.4 Summative evaluation

Summative evaluation is "research designed to determine the extent to which a particular intervention has met its stated objectives" (Bless & Higson-Smith, 2000:157).

This type of evaluation is concerned with a program's overall effectiveness (Center for Program Evaluation and Performance Measurement, 2011?:Summative evaluation). The stated objectives are the outcomes as listed in each unit of the DILP (see Appendix B, Standards, outcomes and DILP specific outcomes). If the students are able to meet these outcomes, the effectiveness of the DILP can be determined.

1.4.5 Digital information literacy

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

A digital information literate student will be able to

- understand a problem and develop a set of questions that will solve the information need.
- solve a 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 from a variety of digital 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.

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

The definition was compiled by also using the following definitions:

- "A program is a collection of instructions that tells the computer what to do" (PC Magazine Encyclopedia, 2011b).
- "digital" is synonymous with ''computer'' (PC Magazine Encyclopedia, 2011a).

1.4.7 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, 2011?:Academic library).

1.4.8 Student

Mothata (2000:166) defines a student as follows: "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".

1.4.9 Student learning

As no appropriate definition could be located in any digital or printed dictionaries, the following definitions were used to compile a comprehensive definition for student learning:

According to Jarvis & Wilson (1999:104), learning is the process of acquiring knowledge and skills and "student" is a term referring to a person pursuing a degree course at an institution of higher learning such as a university (Mothata, 2000:166).

Student learning will therefore be defined as the acquisition of knowledge and skills by a person studying at an institution of higher learning.

1.4.10 Assessment

"Assessment is to determine a rate or amount and is used as an activity to measure student learning" (Hodnett, 2001).

For the purpose of assessment, student learning was measured by using pre- and post-tests.

1.4.11 Outcomes assessment

Hernon and Dugan (2002:66) state that outcomes focus on the competencies students master as a result of the program. In this case the competencies are digital information literacy skills. Assessment, as defined in section 1.4.10, is the activity of measuring student learning (Hodnett, 2001).

For this research, outcomes assessment will be used to refer to the activity of investigating the effectiveness of a learning intervention program in producing change among library users. The program is the DILP, the change may or may not be improved digital information literacy skills and the library users are the students.

1.5   Research approach, methodology and design

The major objective of this research study was to evaluate the DILP and for that purpose a specific approach, methodology and design were used.

1.5.1   Research approach

De Vos (2002a:362) clearly states that program evaluation is one of three types of research that utilise both quantitative and qualitative approaches. Program evaluation

is used when one feels compelled to evaluate an existing program (De Vos, 2002b:374). The DILP would be an example of such a program.

By using the combined qualitative and quantitative approaches, the research focused on Creswell's mixed methodology design model. De Vos (2002a:367) further argues that a full program evaluation offers an excellent example of the mixed methodology design model. Thus, the research used the "mixed aspects of the qualitative and quantitative paradigm". The following will further explain the use of the combined approach:

- The analysis of reported research on the demographics and characteristics of Generation Y and Z was qualitative in nature.
- The analysis of reported research on new technologies and the integration with the DILP was qualitative in nature.
- The analysis of reported research on the historical framework of the evaluation initiatives and the evaluation of the effectiveness of information literacy programs or digital information literacy programs, which includes meaningful assessment of student learning using outcomes assessment, was also qualitative in nature.
- The research design used was a non-randomised quasi-experimental design, which is quantitative in nature.
- The gathering of the numeric information using a pre- and post-test is characteristically quantitative.
- The gathering of the verbal information using telephonic interviews is characteristically qualitative.

The mixed methodology design model, according to De Vos (2002a:366), therefore offers the researcher the opportunity to mix the aspects of the qualitative and quantitative paradigm at all or many methodological steps in the design.

1.5.2 Research methodology

The following table lists the research methodology used for each research objective.

Table 1.1: Research objectives and research methodology used

Research objective	Research methodology
Identify the demographics and characteristics of Generation Y and Z	Analysis of reported research
Integrate new technologies with the DILP	Analysis of reported research
Provide a historical outline of the evaluation initiatives and the evaluation of the effectiveness of information literacy programs or digital information literacy programs, which includes meaningful assessment of student learning using outcomes assessment	Analysis of reported research
Develop an outcomes assessment instrument	Analysis of reported research and quasi-experimental research
Administer the instrument in order to determine the effectiveness of the program in terms of student learning by scoring the pre-and post-tests	Quasi-experimental research
Conduct qualitative telephonic and e-mail interviews with identified students to determine possible problems experienced with certain post-test questions	Quasi-experimental research
Provide evidence of the effectiveness of the program and indicate how the program may be improved to be more effective in enhancing students' digital information literacy skills	Quasi-experimental research

Since an outcome evaluation was done, as the research was interested in the outcomes of the program, a non-randomised quasi-experimental method was used. This methodology was chosen as it is useful for assessing the effects of a treatment – in this case the effect of the DILP. The following section provides a review of the quasi-experimental design.

1.5.3 Research design

De Vos (2005:382) mentions that it is, occasionally, impossible to use classical designs and for practical reasons it is necessary to use non-randomised quasi-experimental designs.

A single-group pre-test/post-test design was chosen as it is an improvement on the post-test design, since measures are taken twice (before and after the treatment) (Jackson, 2009:321). The two measures can then be compared and differences in the measures are assumed to be the result of the treatment.

The principal research instrument used was questionnaires in the form of pre- and post-tests. The questions were predominantly multiple-choice questions with one open-ended question. When the outcome evaluation of the DILP was carried out, a group of students who belong to Generation Y and Z, completed a pre-test, worked through the DILP and completed a post-test. Telephonic and e-mail interviews were also used to collect further data, in cases where students did worse in the post-test than the pre-test.

1.6   Chapter outline

The following table provides an outline of the thesis.

Table 1.2: Overview of the thesis

Chapter	Title	Content
1	Introduction	• Background • Statement of the problem • Scope and objectives • Key theoretical concepts • Research approach, methodology and design

Chapter	Title	Content
2	The South African student as member of Generation Y and Z	• Demographics of Generation Y and Z • Characteristics of Generation Y an Z
3	Integration of new technologies with the DILP	• Multimedia Web sites • Really Simple Syndication (RSS) • Blogs • Digital storytelling • Online games • Social networking • E-mail
4	Evaluation of digital information literacy programs	• Evaluation initiatives by academic libraries • Outcomes assessment
5	The quasi-experimental research phase	• Evaluation research • Quasi-experimental design • Research instruments • Design of data collection instruments • Pilot study • Validity and reliability • Choosing the variables • Data collection • Ethical considerations
6	Data analysis and interpretation	• Quantitative data analysis of the DILP testing results • Qualitative data analysis of student feedback • Presentation and interpretation of the data using descriptive and inferential statistics
7	Conclusions and recommendations	• Overall summary of the study • Conclusions and recommendations • Suggestions for further research

Chapter	Title	Content
		• Concluding comment

1.7   Summary

This chapter dealt with the background to the study, the problem statement, scope and objectives, key theoretical concepts and the significance of the research and also referred to the research approach, methodology and design used. The following chapter will discuss the South African student as member of Generation Y and Z.

Chapter 2

The South African student as member of Generation Y and Z

2.1   Introduction

The need for students at higher education institutions to acquire and develop information literacy skills has been emphasised in recent years in a world where many analysts believe access to information is important for survival and is also the key to prosperity (Feast, 2003:81). Hart (2007:2) further states that there is consensus that students arrive at South African universities without the information literacy skills demanded by tertiary education.

As mentioned in Chapter 1, section 1.1, it is a worldwide trend that academic libraries provide information literacy instruction (Kasowitz-Scheer & Pasqualoni, 2002) and it is the task of librarians to teach information literacy to the students. The students of today are members of the so-called Generation Y (Manuel, 2002:196) and also the new Generation Z.

Also explained in Chapter 1, section 1.1, the DILP was originally designed for South African students who are members of the so-called Generation Y, but members of Generation Z are also now entering universities and are therefore also utilising their libraries. Some of the demographics and characteristics of Generation Y and Z correspond, but there are some demographics and characteristics unique to Generation Z.

The demographics and characteristics of Generation Y were taken into consideration when the DILP was originally designed and developed. It is, however, also important to identify the demographics and characteristics of Generation Z in order to incorporate this information in the existing DILP and therefore make the DILP applicable to and

useful for both generations.

This chapter will then

- explore the demographics of Generation Y and Z.
- identify the characteristics of Generation Y and Z.
- explain how these are applied to the existing DILP to suit both Generations Y and Z.
- suggest possible adaptations to the DILP to accommodate Generation Z.

2.2   Demographics of Generation Y and Z

Demographics are the characteristics of human populations and population segments, especially when used to identify consumer markets (University of Washington Bothell Campus Library, 2010). The "consumer markets" in this study are Generation Y and Z. Demographics involve, for example, age. 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 & Manual, 2001) and are illustrated in Figure 2.1.

Figure 2.1: Demographics
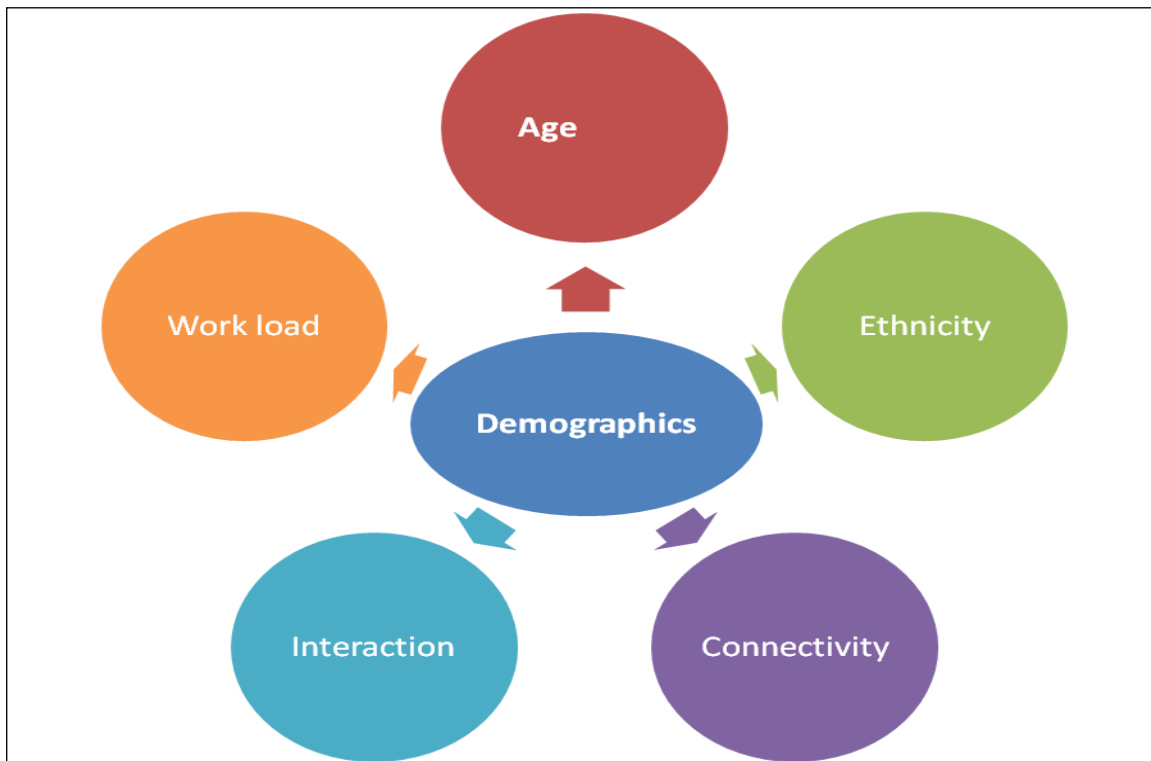
2.2.1 Age

Generation Y are those people who were born between 1978 and 1990 and their ages, in 2010, range between 20 and 32 (Pierce, 2007). Today's Generation Z follows right on their heels. Generation Z comprises anyone born in or after 1990 (Geck, 2006). Their age, in 2010, is 20 years or younger. According to Statistics South Africa (2010:16), there is approximately 13 573 000 youths falling into the age bracket of 20 to 34, which is close to the age bracket of Generation Y and Z in 2010. Generation Y and Z represent approximately twenty seven per cent of the South African population.

About 383 764 of these youths are currently students at higher education institutions in South Africa (Department of Education, 2010:38).

These students use laptops, text messaging and cellular phones to connect to friends,

experts and others in their community and around the globe (Beyers, 2009:218) and will probably find computerised training, such as the DILP, easier than older generations. 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 younger generations are 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 and Z are even more diverse in South Africa, where approximately one in 15.4 is Caucasian (Statistics South Africa, 2010:9).

Wellner (2000) further states that the faces in today's education will include a mix of races, where diversity in ethnicity is on the verge of an explosion. There will also be a wider variety of backgrounds, which will fill the spaces in education. According to the Department of Education (2010:33), the ethnicity of enrolled students representing Generations Y and Z is as follows:

Table 2.1: Student ethnicity at higher education institutions in South Africa

Ethnicity	Total
White	117 493
Black	305 605
Coloured	35 244
Indian/Asian	28 612

If one takes the above-mentioned figures into consideration, one in 4.2 students is therefore Caucasian. The diversity in ethnicity should be taken into consideration in the re-design of the DILP – as 75% of higher education students are from other ethnic groups. Some of the elements, such as graphics and names, should therefore be

aimed at the different ethnic groups.

2.2.3   Connectivity

Connectivity is the ability to access the Internet and utilise online sources (Harvard University, Berkman Center for Internet and Society, 2010: Connectivity).

Generation Y and Z are highly connected, hence the decrease in viewing television and the corresponding increase in time spent on computers, gaming and the Internet (Beyers, 2009:218). According to Kornberger (2009b), nearly 90% of students access the Internet for personal and social purposes. Students at higher education institutions in South Africa have the highest access to the Internet in the country through computer laboratories on their campuses.

Kornberger (2009d) further reveals that 78% of South African students access the Internet *via* their cellular phones, followed closely by 74% who access the Internet from computer laboratories on campus. Figure 2.2 illustrates this. Students are spending 96 minutes online daily *via* a computer and 67 minutes *via* their cellular phones.

Figure 2.2: Modes of access to the Internet
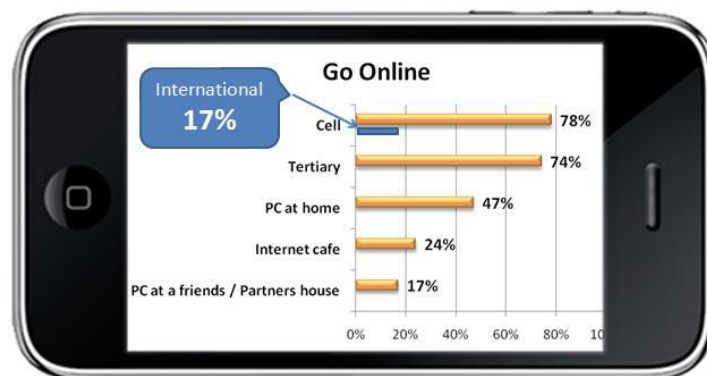
(Kornberger, 2009d).

Connectivity is important to take into consideration, because, if nearly 90% of students

at higher education institutions are using the Internet, the DILP should be presented in a Web environment. The DILP was originally designed and developed to be used in a Web environment.

2.2.4 Interaction

According to Halse and Mallinson (2009), rapid technological changes and the emergence of the Internet are accompanied by the rise of a generation of students for whom interaction is the norm. The technologies that they use are blogs, social networking sites, twitter, text messaging and instant messaging.

According to Faust *et al.* (2001), Generation Y interacts because they are heavily influenced by their peers and Geck (2006) mentions that, because Generation Z is constantly connected by high-speed digital devices, they are always connected to their friends. Both generations therefore interact.

Based on the above-mentioned, the DILP should also include these technologies to facilitate interaction. This is discussed in more detail in Chapter 3.

2.2.5 Work-load – too little time

Students, and especially first-year students, are reported to feel overwhelmed and crunched for time when they enter higher education institutions (Faust *et al.*, 2001). The students must therefore not feel that they are wasting time when working through the DILP and it should not be overwhelming.

The above-mentioned demographics were already catered for in the original DILP; only interaction should still be incorporated by adding, for instance, information on how to create and join blogs.

2.3   Characteristics of Generation Y

A ''characteristic'' is the typical feature or quality that something or somebody has (Oxford advanced learner's dictionary of current English, 2001:182). The characteristics of Generation Y were already applied to the original design and development of the DILP.

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

Table 2.2: Characteristics of Generation Y and the implications for the DILP

Characteristic	Implication
Visual orientation	The DILP is visually orientated and uses appropriate graphics, animations and interactive exercises to enliven it, as suggested by Creanor, Durndell & Primrose (1996:135).
Positivism and enthusiasm	Positive abilities with technology should facilitate the usage of the DILP, since technologies such as computers feature positively in Generation Y's worldviews (Manuel, 2002:198). The fact that it is a *digital* information literacy program indicates 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 can therefore be utilised in a hands-on computer laboratory where online access to the Internet is available.
Choice in products	Students should be able to choose between the units that they want to view. The DILP enables students 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 engages students and presents them with various activities to complete, such as helping a character named Sipho to do bibliographic entries for a digital information source.

Characteristic	Implication
	A variety of question types are used to complete activities, for example answers to certain questions should be given in fill-in-boxes while other questions, such as in the quizzes only require choosing the possible correct answer.
Peer learning	Certain activities include helping characters named Sipho, Sandra and Thandi to complete exercises. Students can also work in a group to complete the various activities.
Importance of mentors	The mentor, working in co-operation with the students and the DILP, can be a human mentor. The mentor should be an experienced person who advises and helps the student over a period of time and it is recommended that a librarian should be the mentor, as librarians usually have knowledge of information literacy and digital information sources.
Memorisation	This generation displays an unwillingness to memorise. The same layout and style used throughout the program facilitate memorisation.
Multitasking	The student should, for example, evaluate Web sites in the DILP. Thereafter he/she needs to compare his/her answers with those of the DILP and then e-mail his/her answers to the DILP developer.
Lack of critical-thinking skills	Proficiency in database searching will assist in overcoming the lack of critical-thinking skills. The DILP requires the application of information. This is done where students need to apply their knowledge of evaluating Web sites by completing various activities.
Diversity of academic skills	The DILP contains a unit with information about study/academic skills and gives an overview of writing skills.
Teamwork	Activities and quizzes in the DILP can be completed as a team.
Non-linear interaction with information	The DILP uses hypertext, since hypertext is in essence non-linear and links related topics/text. Hypertext allows the student to pursue trails through the program by means of links (Wertheimer Meyer & Baber, 1996:304).

2.4   Characteristics of Generation Z

Since the future educational society will be shaped by a combination of Generation Y and Z who will be using digital information literacy programs such as the DILP, it is important to also identify the various characteristics of Generation Z and apply them to

the DILP.

Figure 2.3 illustrates the various characteristics of Generation Z. An explanation of each of these characteristics follows Figure 2.3 and thereafter the implication of each characteristic for the adaptation of the DILP is listed in table format.

Figure 2.3: Characteristics of Generation Z

2.4.1 Computer literacy

It is interesting to note that Generation Z's birth years (1990s) correspond to the birth years of the World Wide Web. The following major events, with regard to the World Wide Web, took place in the 1990s:

- Hyperlinks were created in 1990 and officially introduced in 1991 as the new way

of browsing the Web.

- The Mosaic Web Browser (the first graphical browser) was introduced in 1993 (Geck, 2006).

These digital milestones triggered a technological revolution and are key factors in understanding how Generation Z's computer literacy has been affected (Geck, 2006).

Computer literacy is defined by BusinessDictionary.com (2011) as

> The level of familiarity with the basic hardware and software (and now Internet) concepts that allows one to use personal computers for data entry, word processing, spreadsheets, and electronic communications.

Wellner (2000) remarks that Generation Z may be computer literate even before they start school and are therefore familiar with hardware and software, as well as the Internet. It is important to take note of the computer literacy of South African students.

Czerniewicz and Brown (2010) state that there are students in higher education institutions with different levels of computer experience (ranging from low to high), as well as a significant group in South Africa who had no access to a computer before starting their studies at higher education institutions. Students rely on formal channels to acquire skills, such as end-user computer classes offered at higher education institutions, or they learn to use a computer from their peers or by teaching themselves. However, 99% of students are using the Internet and spend about three hours per day online (Kornberger, 2009a).

2.4.2 Constant communication

According to Dillon (2007:36), Generation Z is constantly in contact with their peers and others as they have access to the Internet, text messaging and instant messaging *via* computers and cellular phones.

Text messaging is the common term for the sending of "short" (160 characters or fewer, including spaces) text messages from cellular phones using the Short Message Service (SMS) (Encyclopædia Britannica, 2011).

Instant messaging is a "combination of e-mail and chat room in which a user corresponds with others online by clicking on a name or names in a list and typing a message, which pops up on a window in the recipient's screen" (Sharpless Smith, 2010:211). Instant messing on social networking sites such as Facebook and MySpace allows Generation Z to communicate with peers, regardless of their physical location.

Kornberger (2009b; 2009c) highlights some key insights:

- 57% of students engage with one another on the Internet for personal and social reasons every day.
- Nearly 90% of students engage a few times per week and when they do engage it is for a period of at least an hour.
- Facebook is their favourite social networking site.

Due to the constant communication characteristics, academic libraries should ensure that Generation Z can communicate with them by creating, for instance, Facebook pages or blogs.

2.4.3 Ceaseless access to information

Generation Z is growing up surrounded by technologies and digital devices such as:

- Web browsers
- Computers
- Broadband
- Wireless connections (Geck, 2006).

33

These high-speed technologies enable them to have access to a wealth of diverse information and vast digital collections *via* their cellular phones and computers.

As mentioned in section 2.2.3, students at higher education institutions in South Africa have the highest access to the Internet in the country through computer laboratories on campus, with 74% of students accessing the Internet on campus and 78% accessing the Internet *via* their cellular phones. Furthermore, cellular phone ownership amongst students is high, with 98.5% of students owning a cellular phone in 2007 (Czerniewicz & Brown, 2010:862), making the cellular phone their main means of access to the Internet, off campus.

As a result, they are used to collecting and receiving information and will expect academic libraries to make resources such as databases, digital information literacy programs and other digital information sources accessible *via* computers and cellular phones.

2.4.4 Electronic multitasking

Generation Z has been exposed to many high-tech influences, high-speed devices and high-speed technologies, which allow them to communicate, access information and contribute to content.

Geck (2006) states that because of having these devices and technologies they will evolve into electronic multitaskers. Electronic multitasking may entail searching for information, while at the same time

- using several Internet browser windows on the same computer.
- using different software applications on the same computer.
- using instant messaging to converse with peers who are not within a conversation range.

- using cellular phones to contact peers who are not physically present and not responding to instant messaging, using text messaging.
- using cellular phones for activities other than talking, such as listening to music.

Electronic multitasking is done mostly by searching the Internet for information, while keeping in touch with social networking sites such as Facebook and keeping up to date by blogging and communicating *via* cellular phones. Kornberger (2009a) points out that 57% of students use, for instance, the Web for personal and social purposes and at least one in three students creates groups online and publishes his/her own blog.

These electronic multitaskers will therefore require that various digital information resources and social media are available in order for them to multitask comfortably, while searching for information.

2.4.5 Effortless with technology

Dillon (2007:35) states that Generation Z, just like Generation Y, is at ease with technology as they do not know a world without the Internet and cellular phones.

In South Africa, cellular phones are one of the preferred modes of access to the Internet amongst students (Kornberger, 2009d).   Evidence of their effortlessness with technology, in this instance cellular phones, is confirmed by Chigona, Kamkwenda and Manjoo (2008). Their study revealed that students use their cellular phones for

- searching the Internet for information for their assignments.
- searching the Internet for the meaning of words.
- searching financial markets and distribute this information to, for instance, parents.
- searching for lecture notes and other academic information.
- downloading course notes from the respective course Web pages and transferring this to a computer.

- accessing university library sites, reserving and renewing books and checking if ordered books had arrived.

Other evidence of their effortlessness with technology is the way in which they search for information. According to Bates (2001), they use clicking and pointing, not writing and typing, to find information. They expect information to be concise and in a readable form. Students would, for instance, download Opera Mini, a mobile phone Web browser that

- displays Web pages in a similar way as a desktop computer.
- compresses data by up to 90% before sending content to a cellular phone, resulting in faster page loading.
- improves speed.
- lowers browsing costs (Opera Software, 2010).

This enables the students to access the before-mentioned information in an effortless way *via* their cellular phones.

2.4.6 Different information seeking behaviours

Having grown up with digital information, Generation Z seeks information differently to other generations. They expect information to be dynamic and not static (Dillon, 2007) and they believe that the information they need for an assignment will be freely available on the Internet. According to Geck (2006), a preferred method of searching for information is an Internet search, starting with a Google search. Studies conducted in South Africa proved that this also applies to South African students (Niemand, 2010 and Nkomo, 2009:137).

Niemand (2010) confirmed that the majority (61%) of the students in his study indicated that search engines were used to source information for assignments from the Internet, with Google being the favourite search engine. Nkomo (2009:137) also found that the

majority of students search the Internet and, more specifically, Google.

With Google searches students normally just concentrate on the highest-ranked results on the first page, without even scrolling. This is also evident in Niemand's (2010) study where students indicated that search engines only partially satisfy their information needs. This search strategy, according to Geck (2006), shows their inability to evaluate results and shows that they view all top results as being equal and worthy.

They often do not understand the inner-workings of the Internet or how commercial search engines rank results. They do not realise some information forms part of the invisible Web, which is hidden from a search engine's results and is therefore difficult to find. They are also unaware that some digital information sources on the Internet and commercial subscription databases are not free of charge.

They do, however, spend a large amount of time browsing the Web, not placing time constraints on themselves. Kornberger (2009b) confirms this and shows that students spend more than seven hours a week online, while Niemand's (2010) study shows that 51% of the sample in his study accesses the Internet several times a week.

Geck (2006) also mentions that their inability to search the Web effectively causes them to spend excessive amounts of time browsing. They are not aware that other information sources, such as printed material, might be more suitable to answer certain types of questions, which could save them a lot of time.

The implications of the above-mentioned are that academic libraries should provide them with quality information from traditional library sources as well as reliable Internet sources.

2.4.7 Wide range of experiences

As mentioned in section 2.2.2, the faces in today's education will include a mix of races,

where diversity in ethnicity is on the verge of an explosion. There will also be a variety of backgrounds, which will fill the spaces in education (Wellner, 2000). This is even more prevalent in South Africa as there are many disadvantaged students in South Africa that have no access to computers.

A large-scale community survey which was conducted in all provinces in 2007 (latest statistics available) by Statistics South Africa shows that, for instance, only 15,7% of households have a computer, as shown in Figure 2.4. It can therefore be concluded that students from households without computers would have different experiences than students coming from households with computers.

Figure 2.4: Percentage of households with household goods in working order

	Radio	Television	Computer	Refrigerator	Landline telephone	Internet facili-ties at home	Cellphone
Census 2001	73,0	53,8	8,6	51,2	24,4	–	32,3
CS 2007	76,6	65,6	15,7	63,9	18,6	7,3	72,9
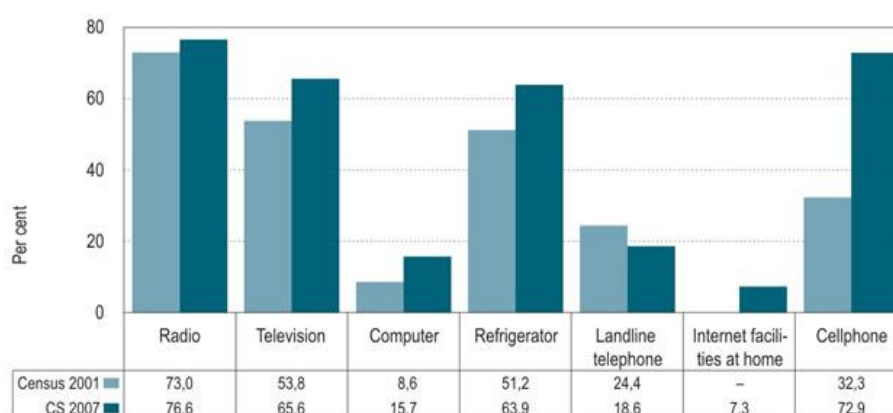
Note: CS 2007 = Census 2007

(Statistics South Africa, 2007).

This will result in varying degrees of computer literacy, ranging from low to high (Czerniewicz & Brown, 2010). A significant component of the South African student population has had no access to computers, before starting their academic studies at higher education institutions. However, as mentioned in section 2.4.1 Computer literacy, they rely on formal channels to acquire skills, such as end-user computer classes offered at higher education institutions, or they learn to use a computer from

their peers or by teaching themselves. Niemand (2010) also confirmed with his study that some respondents indicated that their Internet skills were self-taught.

Academic experience (or lack thereof) should also be taken into consideration. Wellner (2000) states that some individuals are not ready for higher education as they do not have word recognition skills – and this number is growing. Jaffer, Ng'ambi and Czerniewicz (2007) mention that one of the major learning challenges facing higher education in South Africa is the diversity in students' academic preparedness and schooling background.

Due to these different experiences, academic libraries at higher education institutions should customise digital information literacy programs to suit the individual student and his/her academic experience. Academic libraries can, for example, allow the student to choose what he/she wants to learn during digital information literacy instruction.

2.4.8 Learning coupled with entertainment in the form of visual and audio information

Visual and audio forms of information presentation are hardly new, as Sullivan (2005:58) states that "audio and visual methods of storytelling and learning have served a vast population of man for many … millennia".

Large, Beheshti and Breuleux (1998:359), in an acknowledged older study with young people, found that they seldom use multi-media resources when searching to solve tasks, as it is difficult to extract the exact information required.

According to Williams and Rowlands (2007:13), there is a certain preference for visual information due to the popularity of video cameras and live video links *via* the Internet, but text still plays an important role in the lives of Generation Z when information needs to be conveyed. This is reiterated by Niemand (2010) stating that only three percent of the respondents in his study indicated that audio-visual information is important.

Literature dealing with young people's use of such information for assignment completion, states that what is more important than entertainment is finishing the assignment by expending the least amount of effort (Williams & Rowlands, 2007:15).

Fidel, Davies, Douglass, Holder, Hopkins, Kushner, Miyagishima and Toney (1999:28), as well as Large, Beheshti and Breuleux (1998:359), observed that students ignored entertaining diversions on the screen, such as moving images, in order to complete tasks. There was, however, evidence in both papers that when students were not under any obligation to find specific information, they would rely on information that was displayed in a graphic form and deduce from the graphics what the sites were about and whether or not they were likely to be useful (Fidel *et al.* 1999:29).

Academic libraries offering digital information literacy programs should therefore ensure that visual and audio information, together with text, are included in these programs, yet without diversions such as moving images.

It was mentioned in section 2.1, that this chapter will also explain how the characteristics of Generation Z will be applied to the existing DILP to suit this specific generation. The above-mentioned characteristics, with their implications for the DILP, are therefore tabled below.

Table 2.3: Characteristics of Generation Z and the implications for the DILP

Characteristics	Implication
Computer literacy	The DILP was designed and developed to be used in an Internet environment and, although students from Generation Z have low to high computer literacy skills, they do acquire computer literacy skills in various ways and should feel comfortable using the DILP.
Constant communication	The DILP currently offers no means of

Characteristics	Implication
	communication. Links should be incorporated to enable students to communicate with peers and even librarians, using, for example, a simple *mailto:* link for e-mail communication, Facebook or a blog (Sharpless Smith, 2010:154-155). A Facebook group and a blog were created for the DILP.
Ceaseless access to information	As mentioned in section 2.4.3, 78% of students access the Internet *via* their cellular phones. This does not have a direct impact on the DILP as such; however, students would expect to access remotely, information offered by academic libraries such as databases, programs like the DILP and other digital information sources through an academic library's homepage.
Electronic multitasking	Electronic multitasking is done mostly by searching the Internet for information, whilst keeping in touch with social networking sites such as Facebook and keeping up to date by blogging and twittering. To enable the students to do this, links were added in the DILP to a Facebook page and a DILP blog. The DILP can also explain to students how to join and use twitter.
Effortless with technology	Generation Z expects information to be concise and readable. They use pointing and clicking activities to find information and prefer to type rather than write. These are already incorporated in the DILP. The information in the DILP is concise: there are pointing and clicking activities and also exercises that need to be completed by typing short words and/or sentences.

Although they have a practical understanding |

Characteristics	Implication
	of technology, they do not have the skills to perform information management and research tasks necessary for academic success (Katz, 2007). These are covered in various units of the DILP.
Different information seeking behaviours	This Generation is used to collecting and receiving information, but they do not evaluate the information (Geck, 2006). The DILP contains a unit highlighting the importance of the evaluation of information. It emphasises the importance of other digital information access tools and digital resources like the library's collection of digital information sources.
Wide range of experiences	The DILP allows students to choose what they want to learn whilst using the DILP. They can choose to do any unit in any sequence they want. Due to the different experiences that students might or might not have, such as the lack of word recognition skills, the DILP provides them with pop-ups, explaining relatively unknown words. The DILP includes a guideline for the planning and writing of assignments to address the ranges in academic skills.
Learning coupled with entertainment in the form of visual and audio information	A variety of visual and audio information is already presented in the DILP, for example: • power point presentations • activities • quizzes • other visual information in the format of graphics and sound. The DILP includes the latest audiovisual information such as YouTube videos and information about digital storytelling.

Following the above-mentioned discussions of the characteristics of Generation Y and Z, the following overlapping characteristics between the generations were identified.

Table 2.4: Overlapping characteristics between the generations

Generation Y	Generation Z
Visual orientation	Learning coupled with entertainment in the form of visual information
Technology as motivation	Effortless with technology
Choice in products	Wide range of experiences
Boredom	Learning coupled with entertainment in the form of visual and audio information
Peer learning	Constant communication (mostly social)
Multitasking	Electronic multitasking
Lack of critical skills	Different information seeking behaviours (generation do not evaluation information)

The necessary adaptations were made to the DILP in order to accommodate Generation Z as well.

2.5   Summary

This chapter focused on exploring the demographics of Generation Y and Z, identifying the characteristics of Generation Y and Z, explaining how these were applied to the existing DILP to suit Generation Y and suggesting possible adaptations that will be made to the DILP, to make it more acceptable to Generation Z.

The following chapter will discuss the integration of new learning technologies with the DILP in order to make the DILP applicable to and useful for both generations.

Chapter 3

The integration of new technologies with the Digital Information Literacy Program (DILP)

3.1   Introduction

As mentioned in Chapter 2, section 2.5, new technologies have emerged in higher education, changing the way students learn. Lomas (2005) and Fawcett (2004) name these new technologies *learning technologies* or *e-learning technologies*.

Learning technologies in its broadest sense can be defined as

> the range of communication, information and related technologies that can be used to support learning, teaching, and assessment (Association of Learning Technology, 2010).

Educause (2011) provides a more specific definition:

> The term learning technologies encompasses information and instructional technology, as well as telecommunications tools, applications and systems that support learning.

Learning technologies can therefore be the combination of computers, cellular phones, the Web – and its applications such as blogs – as well as programs such as the DILP, supporting digital information literacy learning.

Sharpless Smith (2010:123-124, 152-155), Lomas (2005), Fawcett (2004) and Kiili (2005:13) further identify various new learning technologies which are becoming visible in higher education. They are:

- Multimedia Web sites

- Real Simple Syndication (RSS)

- Blogs

- Digital storytelling

- Online games

- Social networking

- E-mail.

The inclusion of these specific learning technologies was influenced by the scope and goals of the DILP and the above learning technologies were therefore the most applicable to incorporate in the DILP during the revision of the program in 2010. Other new technologies may be incorporated in the DILP as they emerge.

This chapter will explore these emerging learning technologies and explain their use in the acquisition of digital information literacy skills and also how they were integrated with the DILP.

3.2   Multimedia Web sites

The arrival of Web 2.0 technology has made it possible to incorporate multimedia content that is created by others and/or hosted on other Web sites (Sharpless Smith, 2010:123-124).   An example is YouTube (www.youtube.com), where videos are uploaded and shared. These videos can be embedded into web-based instruction.

To incorporate the multimedia in the DILP, pre-existing videos covering the content of some of the topics in the DILP were searched for and embedded in the DILP. The topics covered are:

- Boolean operators
- Digital storytelling
- RSS
- Blogs

- Twitter
- Facebook.

Figure 3.1 is an example of an embedded video in the DILP.

Figure 3.1: Embedded Boolean operator video
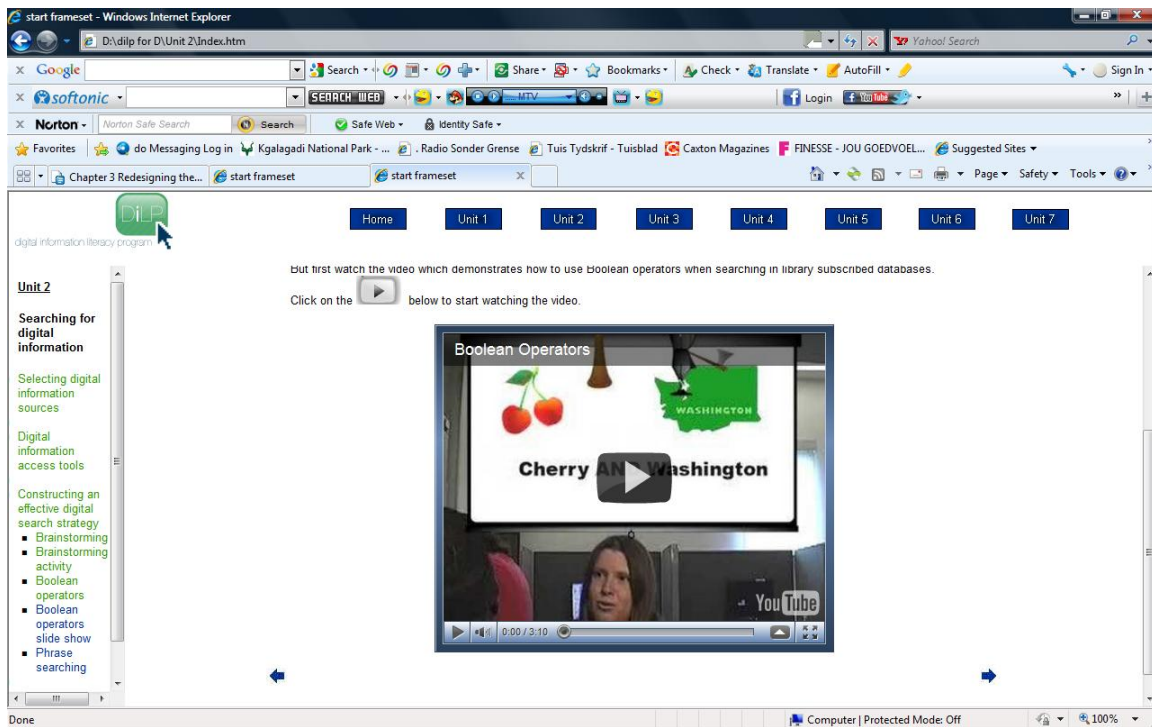
3.3 Real Simple Syndication (RSS)

RSS is a tool used to distribute content and its most widespread usage is in distributing news headlines on the Web. Sound files and videos can, however, also be distributed. Encyclopædia Britannica (2011) points out that RSS provides the subscribers with new content from frequently updated Web sites.

The Web sites that use RSS (indicated by this icon) create special files, called feeds, that are updated periodically to contain the sites' latest information. By way of an aggregator or reader – a piece of software that can be downloaded – like Google

Reader, users subscribe to the RSS feeds of as many Web sites as they want (Cohen, 2004).

The aggregator scans the subscribed RSS feeds and the new content will be delivered to the user. By using, for example, Google Reader, the user then has a single source where all the latest content is automatically available.

The advantages of using RSS are the following:

- It saves time (users do not have to check various sites every day to see if there is anything new)
- There are no advertisements or spam in RSS feeds
- It provides access to a variety of new information sources - not just text, but also videos, images, *etcetera*
- Academic libraries can deliver content to their patrons
- It provides access to a variety of information, for example news headlines from newspapers, updates on projects, new products and also the latest research available on a specific topic in journals
- Aggregators are inexpensive and setup requires less than ten minutes (Cohen, 2004).

RSS was incorporated in the DILP in Unit 7: Keeping up to date with digital information sources, by adding a section explaining what RSS is. A video was also embedded. The video explains what RSS is and also what an RSS feed is. Figure 3.2 shows how it looks in the DILP.

Figure 3.2: RSS section in the DILP
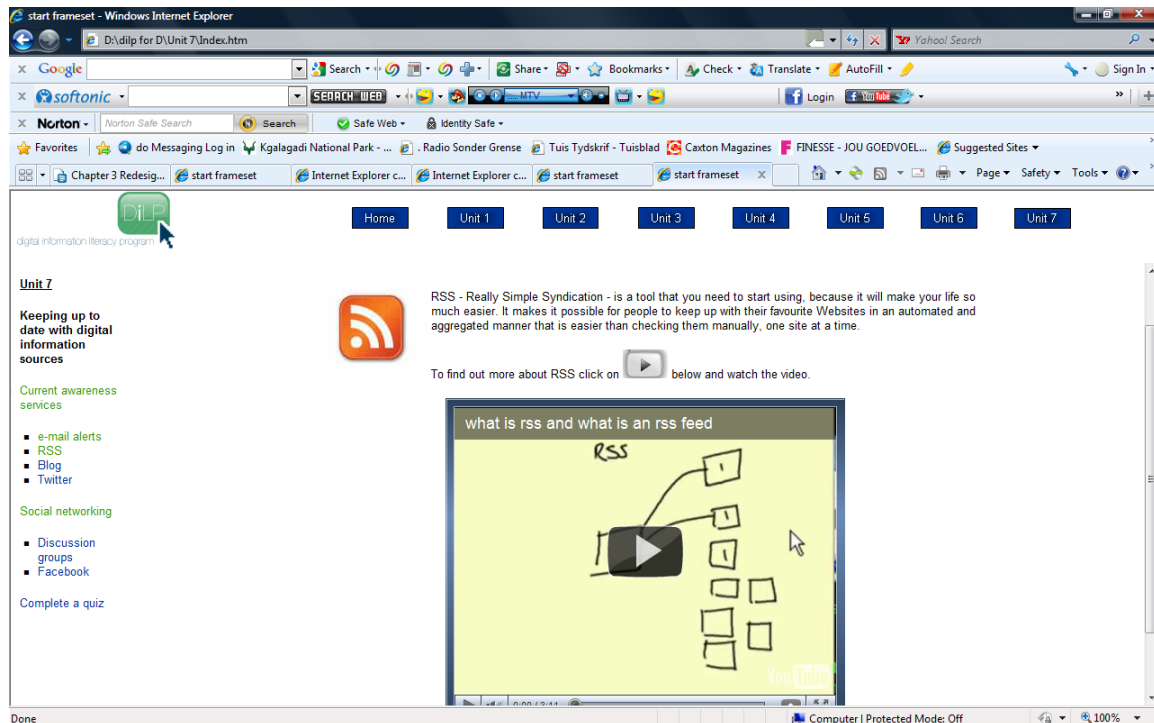
3.4   Blogs

According to Sharpless Smith (2010:216),

> A blog is a shared online journal where people can post entries on various subjects depending on the subject focus of the blog.

The format is similar to a personal diary where thoughts are published chronologically with the newest entry at the top of the page, to enable repeat visitors to catch up by simply reading down the page until they reach a link they saw on their last visit (Downes, 2004). The hyperlinks provided by the author of the blog can either be

- to other bloggers - thereby establishing peer-group relationships and also linking students to an online community (Huffaker, 2004), or

- to Internet items that relate to his/her specific blog (Downes, 2004).

The advantages of blogs are

- the ease of use – a blog owner can edit or update a new entry without worrying about page formats or HTML syntax (Downes, 2004).
- the hosting services are free of charge. A hosting service is a Web site that will give access to persons to everything they need in order to create a blog. It offers, for example, a form to input entries, some tools that allow one to create a template for one's blog and access to some built-in accessories (Downes, 2004).
- that it is situated on the Internet, allowing bloggers to access their blogs anywhere and anytime an Internet connection is available, therefore creating an environment for learning (Huffaker, 2004).

In summary, blogs were used in the DILP as follows:

- Unit 7: Keeping up to date with digital information sources, which currently deals with Newsgroups (online areas in which users have discussions about a particular subjects), was replaced by information about blogs.
- Unit 7 shows students how to create their own blogs, using blogger.com. This was also done by embedding a video. Figure 3.3 shows the blog page in DILP.
- The DILP also links students to the DILP blog which covers digital information literacy aspects such as multimedia on Boolean operators, digital information literacy quizzes, *etcetera.* Figure 3.4 shows the DILP blog. The DILP blog can be found at: http://dilpstudent.blogspot.com.

Figure 3.3: Blog page in DILP
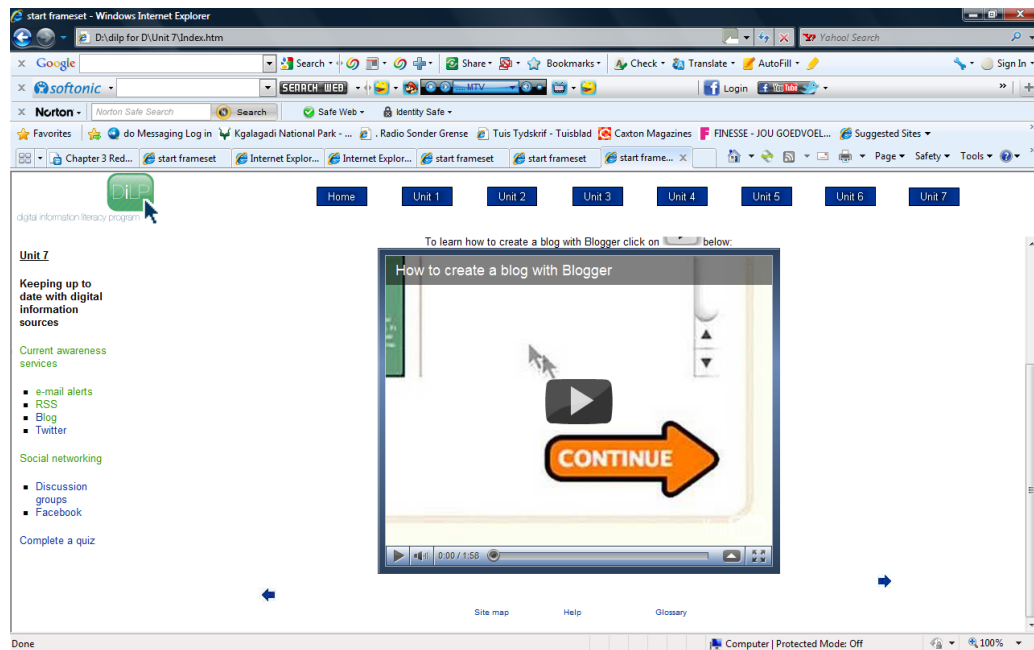
Figure 3.4: DILP blog
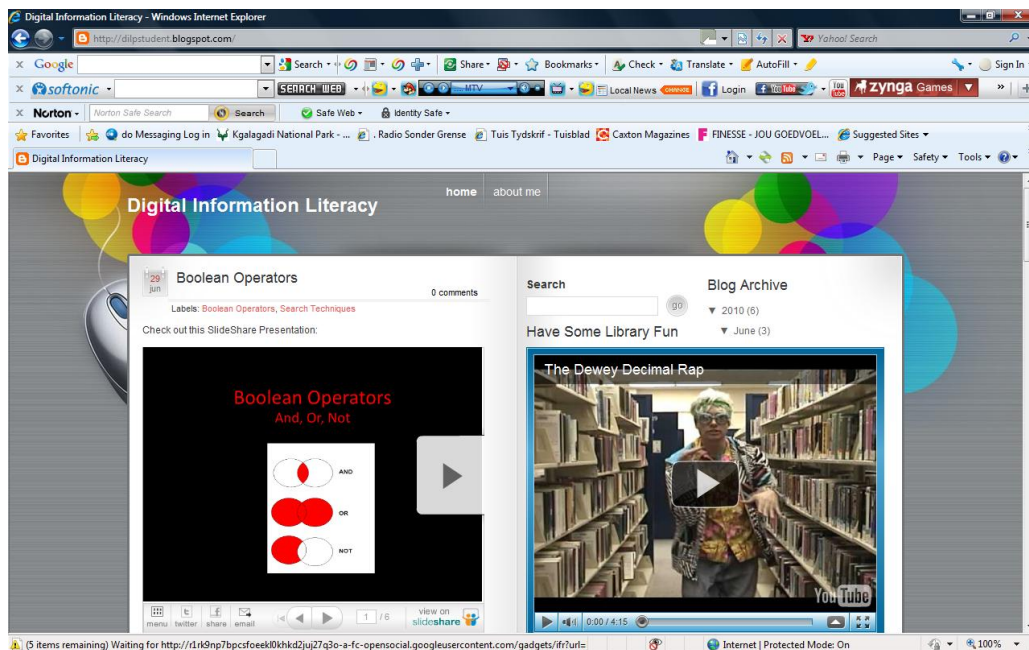
3.5   Digital storytelling

According to the University of Houston (2011), digital storytelling is the practice of using computer-based tools to tell stories. Digital storytelling, as in the case of traditional storytelling, revolves around a chosen theme (Robin, 2008) and integrates a variety of digital multimedia, for example:

- Digital graphics
- Text/script
- Recorded audio narration
- Video
- Music.

Since it contains digital information and multimedia, these stories can be watched on television and computers and can be easily stored, archived, transferred or manipulated (Howell & Howell, 2003).

Digital stories vary in length, but, when used in education, are normally between two and ten minutes. The incorporation of digital storytelling in education – the teaching and learning environment – allows students to

- construct their own learning, by moving from passive viewers to active participants in the process of learning.
- learn to develop and work with digital tools to help develop their digital information literacy skills.
- become critical viewers of media (Howell & Howell, 2003).
- use new material in conducting research.
- synthesise large amounts of content.
- organise their ideas.
- present their ideas in an individual and meaningful way (University of Houston, 2011).

Topics used in digital storytelling can range from personal tales and retellings of historical events to the teaching and introduction of a specific subject (Dogan, 2008). The topic chosen for inclusion in the DILP was an introduction to a specific subject, namely digital storytelling. Robin (2008) suggests using an engaging, multimedia-rich digital story to capture the attention of students whilst stimulating their interest to create their own digital story.

Unit 4: Obtaining and managing digital information of the DILP therefore contains a page with an introduction to digital storytelling as well as an embedded digital story video explaining what digital storytelling is. Figure 3.5 shows the digital storytelling page in the DILP.

Figure 3.5: Digital storytelling in the DILP
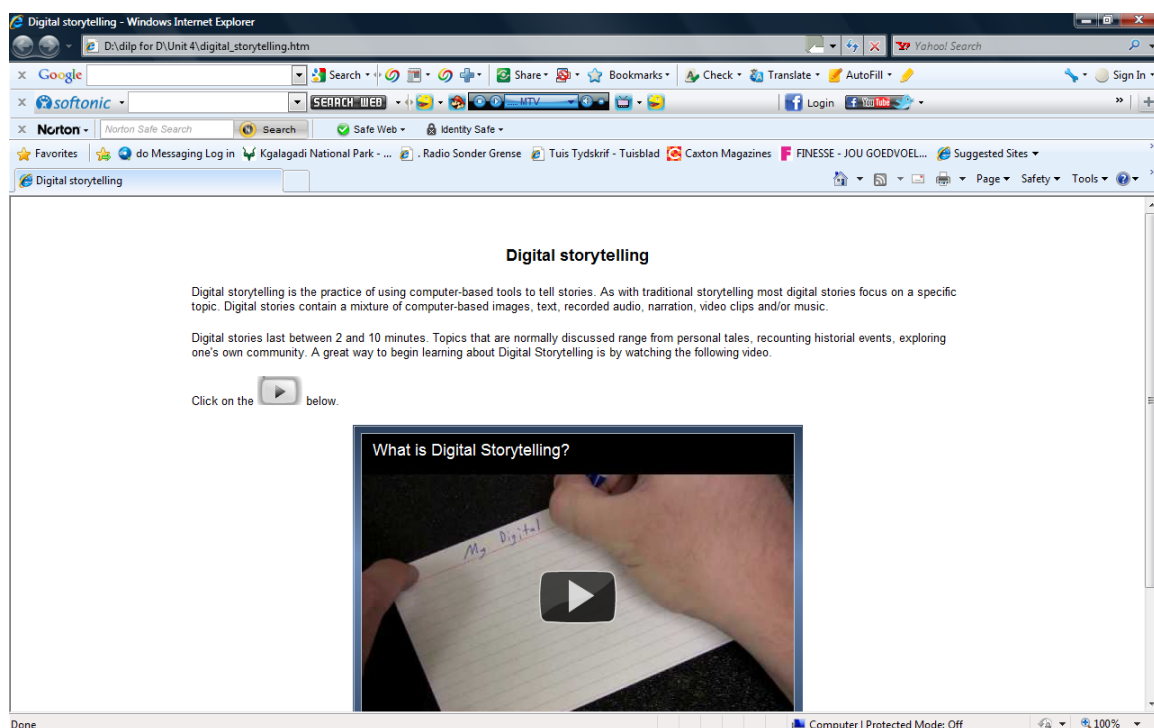
3.6 Online games

TechEncyclopedia (2011) defines online games as:

> Games that can be played by an individual with a specialised game machine (video game console) or a computer and gaming software. Many games are designed for multiple players, who can interact and compete with each other using a computer over a LAN or the Internet. That also includes traditional card games, for example, four people, each in different locations around the world, can play bridge together over the Internet.

According to Papastergiou (2009:1), games are particularly appealing to adolescents and play a central role in young people's lives, whilst forming an integral part of their social and cultural environment. The fact that games are generally challenging induces them to play games.

Papastergiou (2009:1) further states that games that include educational objectives and subject matter hold the potential to render the learning of academic material in a more learner-centred, enjoyable, interesting, and therefore more effective way.

Games also provide powerful learning environments for a number of reasons. The reasons, amongst others, are:

- They support active, multisensory, problem-based learning
- They favour activation of prior knowledge
- They provide feedback, enabling players to learn from their actions
- They encompass opportunities for self-assessment through the mechanisms of scoring and reaching different levels
- They become social environments where communities of players are involved (Oblinger, 2004:8).

Various skills, for example problem-solving and critical thinking, can be developed by using online games (McFarlane, Sparrowhawk & Heald, 2002:13) and for these reasons games should be included in educational software such as the DILP.

Subsequently, a link to a game called The Information Literacy Game was added to the DILP. The game was created by Scott Rice and Amy Harris (2007) of the University of Carolina, Greenboro, University Libraries.

The Information Literacy Game is an online board game which allows up to four students to play, using a question-and-answer format.   Students take turns moving around the board answering questions, while attempting to get one question right in each of 4 categories:

⬣ Category 1 - Choose Your Resource

⬣ Category 2 - Searching/Using Databases

⬣ Category 3 - Cite Your Sources/Avoid Plagiarism

⬣ Category 4 - Library Wild Card

The information literacy goals of the game are based on the DILP's outcomes. The outcomes are, for example, to

- understand that information can be found in a variety of sources.
- understand the function and use of information sources.
- identify useful information from various information sources and online databases.
- understand the way collections of information are organised and accessed.
- determine when to cite a source and cite it properly using a specific citation style.

Figure 3.6: Example of the online board and questions asked
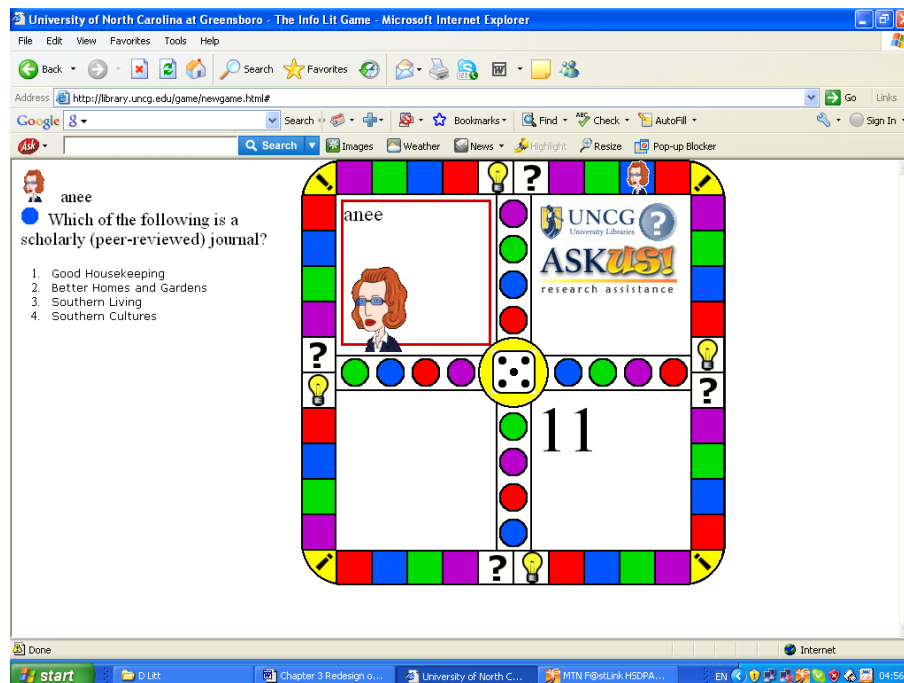
3.7   Social networking

The Web today is built around the concept of social networking (Sharpless Smith 2010:21), in other words, building communities who share interests and activities. There are various social networking sites, for example Facebook, myspace.com and Linkedin.

Facebook was rated as the most popular social networking Web site in 2011, with an estimated 550,000,000 unique monthly visitors (eBizMBA, 2011). It is so popular that it was ranked the second-highest-trafficked site in 2010 (Sharpless Smith, 2010:70). Facebook has become universally used by today's students.

Corbett (2010) mentions that the largest demographic group on Facebook, in January 2010, was 35 to 54-year olds followed by 18 to 24-year olds. Due to Facebook's

popularity with students and the fact that a large demographic group on Facebook is from Generation Y and Z, a Facebook group for the DILP was created on Facebook. Figure 3.7 is of the DILP Facebook group.

Figure 3.7: DILP on Facebook
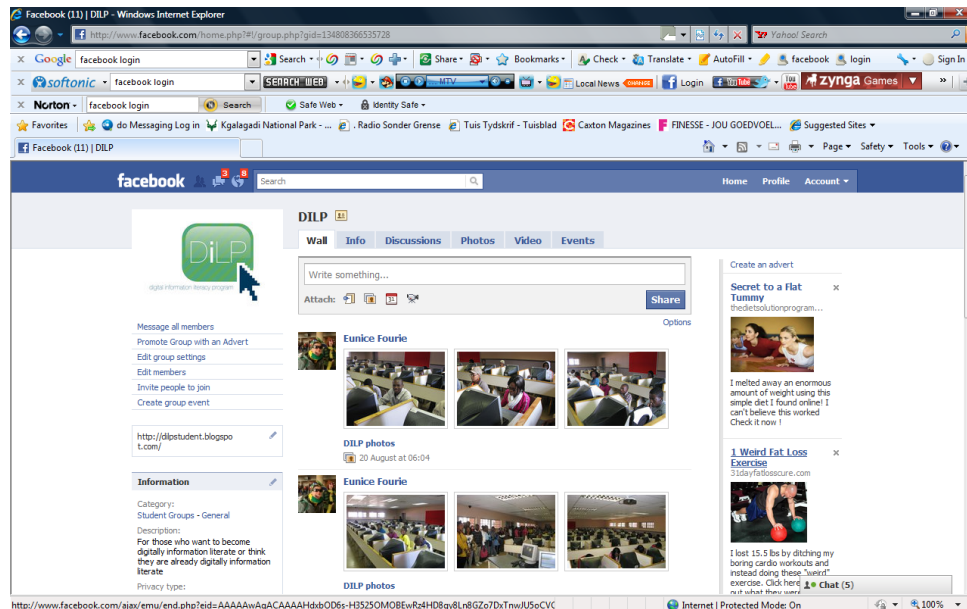
Unit 7: Keeping up to date with digital information sources also contains a page explaining what Facebook is and has an embedded video showing how to open an account on Facebook (see Figure 3.8). Another page invites students to join the DILP group on Facebook.

Figure 3.8: Facebook page in DILP
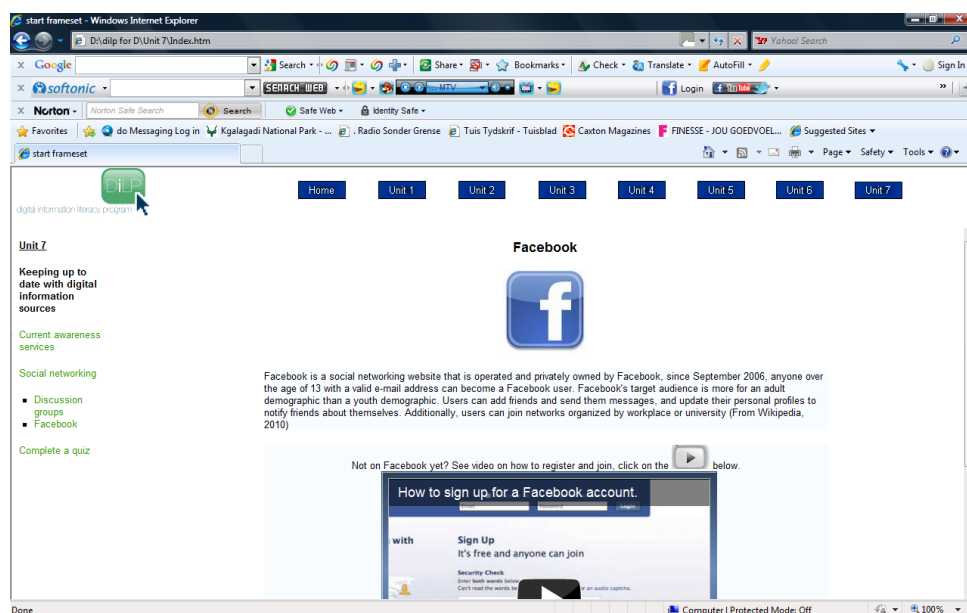
3.8 E-mail

In Chapter 2, section 2.2.4, it was mentioned that interaction is a characteristic of Generation Y and Z and is therefore important to incorporate in the DILP. Sharpless Smith (2010:153) also mentions that interactivity should be included in instruction.

Communication is an interactivity method that can be used. One way of doing this is by using e-mail (Sharpless Smith, 2010:153). By including a *mailto:* link in the DILP, students can communicate with the librarian or the training librarian. The current e-mail link is to the developer of the DILP, but libraries can personalise this.

3.9 Summary

This chapter explored emerging learning technologies, explained their usage in the learning of digital information literacy skills and also indicated how they were integrated with the DILP. The redesigned DILP will therefore be used to evaluate its effectiveness in enhancing the digital information literacy skills of Generation Y and Z.

The next chapter will provide a historical outline of the evaluation initiatives by academic libraries, the evaluation of information literacy and digital information literacy programs as well as the evaluation of the effectiveness of digital information literacy programs using outcomes assessment.

Chapter 4

Evaluation of digital information literacy programs

4.1   Introduction

In Chapter 1, section 1.1, it was mentioned that the ACRL's Institute for Information Literacy (2011) considers the evaluation of information literacy programs as one of the characteristics that illustrate best practice. Kirkpatrick and Kirkpatrick (2006:3), Mouton (2001b:572), Bennett (2003:7) and Weiss (1972:2) are of the opinion that the reason for evaluation is to determine the effectiveness of a training program.

King and Ory (1981:32) stated in 1981 already that there is insufficient research on effectiveness, especially the effectiveness of instruction and has been for long a concern of librarians. In his influential article, Barclay (1993) pointed out that librarians need to evaluate library instruction programs as there is an increased demand for evaluation. He also asserted that some hard evaluation data is better than no data at all or data gathered simply from anecdotal observations or surveys of student satisfaction.

Pausch and Popp (1997) further point out that library literature reveals few rigorous efforts to evaluate the teaching of information literacy skills. In recent years, Noe and Bishop (2005:174) as well as Walsh (2009:19) mention that insufficient research has been conducted on whether information literacy programs are effective.

Tronstad *et al.* (2009:54) agree that comprehensive evaluation of online tutorials is sparse and Sharpless Smith (2010:177) remarks that "the evaluation process is often the part of a project that falls by the wayside".

The purpose of this chapter is to provide a historical outline of the evaluation initiatives by academic libraries, the evaluation of information literacy and digital information literacy programs and the evaluation of the effectiveness of digital information literacy

programs using outcomes assessment.

4.2   Evaluation initiatives by academic libraries

There has been interest in and concern over the lack of forceful research in the library field since 1942, when Beals (1942:159-181) drew the attention of librarians to the lack of research, and Werking (1980:153-154) critised librarians for the general lack of meaningful evaluation of library instruction programs.

This section will therefore present an outline of

- the calls for evaluation of library instruction (ranging from bibliographic instruction and user education/instruction to information and digital information literacy).
- the actual evaluation that took place, also ranging from bibliographic instruction and user education/instruction to information and digital information literacy programs.

These issues were researched by searching major, relevant databases – Academic Search Premier, ERIC, Emerald, Proquest, Library Literature and Information Science Full Text and Information Science & Technology Abstracts during 2009 and 2010.

Formal subject headings were identified and used in preference to other fields within each database. This meant that slightly different search terms were used in each database, but the relevant articles covering the same topics were retrieved each time. Searches were limited to peer-reviewed articles only, as a measure of quality. Searches were also limited to a 1989-2010 date range as Chadley and Gavryck (1989) state that evaluation of library instruction and courses was actually less common than Mensching (1989) suggested.

The following table presents an overview of calls for evaluation of library instruction.

Table 4.1: Overview of calls for evaluation of library instruction

Author	Date	Comments by authors
Beals	1942	Lack of hard research in the library field
Werking	1980	General lack of meaningful evaluation of library instruction programs
Cottam	1982	When there is evaluation of library instruction, it is conducted as an afterthought, instead of planned evaluation
Hardesty, Lovrich and Mannon	1982	"There is a good deal of talking about evaluation, but few seem to be doing anything about it."
Mensching	1989	A survey found that only 62% of responding libraries did any kind of evaluation at all and only 23% of responding libraries used testing for evaluation
Chadley and Gavryck	1989	Evaluation of library instruction was actually less common than Mensching's study suggests
Eadie	1992	Most evaluations of library instruction focused on user satisfaction rather than on what students really learned

(The full bibliographic details of the above-mentioned sources can be found in the bibliography).

From 1942-1980, there was a general lack of evaluation of library instruction and from 1982-1989, it is evident that evaluation of library instruction was done as an afterthought (instead of planned evaluation) and focused mainly on user satisfaction.

The following table, Table 4.2, lists the research done in the field of evaluation of library instruction, library skills and such programs.

Table 4.2: Overview of evaluation of library instruction, library skills and such programs

Author	Date	Evaluation done
Frick	1990	Qualitative evaluation of user education programs
James and Nahl	1990	Measuring information searching competence
Edwards	1991	Measuring the effects of a self-paced instructional workbook on students' library skills
Piette and Smith	1991	Evaluating a hypercard library instruction program
Trail and Gutierrez	1991	Evaluating a bibliographic instruction program
Feinberg and King	1992	Performance evaluation in bibliographic instruction workshop courses
Kenny and Schroeder	1992	Evaluation of a training program for CD-ROM databases
Barclay	1993	Evaluating library instruction using testing to determine students' ability to use the library
Ruscella	1993	Bibliographic instruction for freshman athletes and the evaluation of the project
Morrison and Dance	1994	Students' evaluation of library research instruction
Bober, Poulin and Vileno	1995	Evaluating library instruction and barriers to successful implementation of evaluation
Fenske and Clark	1995	Evaluating students' library skills before and after library instruction
Martin and Jacobson	1995	Evaluation of bibliographic instruction
Tiefel	1995	Focuses on effectiveness of library user education and evaluation studies of library user education
Creanor, Durndell and Primrose	1996	Highlights the evaluation of the effectiveness of five hypertext information skills modules
Fox, Richter and White	1996	Details are presented on the use of a multidimensional evaluation process to assess program effectiveness
Kanamugire	1996	Evaluates the impact of bibliographic retrieval education programs
Kunkel and Weaver	1996	Testing undergraduate library skills
Daugherty and Carter	1997	Assessment of outcome-focused library instruction
Geffert and Bruce	1997	The long-term effectiveness of bibliographic instruction

Author	Date	Evaluation done
		programs was studied by evaluating research skills
Bell and Benedicto	1998	Evaluation of library courses by measuring whether students learn how to find information and critically evaluate both printed and electronic resources
Colborn and Cordell	1998	Discuss the distinction between student evaluation and program assessment and the development of assessment methods for library instruction
De Jager and Nassimbeni	1998	Present an outline and an evaluation of an information literacy programme
Fenske	1998	Pre- and post-tests to evaluate student learning of library's information system
Toifel and Franklin	1998	Study to examine the effectiveness of instruction methodology employed by librarians
Calderhead	1999	Describes a bibliographic instruction program and the students' evaluation of the program
Clarke	1999	Development of user education is discussed and evaluation of programs outlined
Fourie and Van Niekerk	1999	Deal with the portfolio assessment strategy to assess information literacy and online searching skills
Horan	1999	Focuses on sketch maps as a tool for assessing library skills
Jackson	1999	Explores and compares the effectiveness of computer-based video training for database searching
Lawson	1999	Assessment of a course in information sources using pre- and post-tests to evaluate library research skills
Leckbee	1999	A survey strategy was developed to study attitudes toward research and student experiences in the campus library
Nahl	1999	Considers the effectiveness of both print and online search aids and points to the need to test these materials on user groups
Niemeyer	1999	Examines a computerised examination as evaluation for a library skills course
Tolppanen	1999	Survey results of Web use by students indicate lack of searching and critical-thinking skills

Author	Date	Evaluation done
Germain, Jacobson and Kaczor	2000	Effectiveness of two library instructional methods
Riddle and Hartman	2000	Designing an assessment of first-year library instruction
Samson	2000	Describes the development of a curriculum-integrated and tiered instruction program and the implementation of a web-based assessment tool as a mechanism for establishing levels of information literacy
Tobin and Kesselman	2000	Evaluation of a web-based library instruction program
Williams	2000	Creativity in assessment of library instruction
Alexander and Smith	2001	Describe a quasi-experimental study that compared a traditional "required for credit" class in library skills with a web-based course
Bowden and DiBenedetto	2001	Program assessment by judging the quality of students' final reports and student feedback questionnaires
Chapman, Pettway and White	2001	The portfolio as an instruction program assessment tool
Cox and Housewright	2001	Assessment techniques to measure student learning and program effectiveness
D'Angelo	2001	Integrating and assessing information competencies in a gateway course
Furnish	2001	Evaluating electronic instruction services
Fagan	2001	Selecting test item types to evaluate library skills
Faust	2001	Shares experiences in the assessment and evaluation of an information literacy course
Shoham	2001	Evaluating the effectiveness of bibliographic instruction
Dunn	2002	Assessing information literacy skills
Emmons and Martin	2002	Evaluating the contribution of a library instruction program to the quality of students' research
Hoffman	2002	Assessment of online library instruction applying the Likert scale to a series of questions designed to gauge the degree to which students felt competent applying course skills
Tennant and Miyamoto	2002	Exit surveys of students to indicate usefulness of library sessions and librarian's instruction
Flaspohler	2003	Information literacy program assessment

(The full bibliographic details of the above-mentioned sources can be found in the bibliography).

The evaluation covered in the preceding tables was mostly on library instruction, information skills and such programs which entail

- the usage of library resources such as CD-ROMs, specific databases, printed reference sources and Internet resources.
- bibliographic instruction such as using the catalogue.
- students' opinions of instructional programs.

This is also highlighted by Rader (2000) who states that, throughout a 25-year period (1973-1998), evaluation was concerned with how librarians performed as teachers, what the students gained from the instruction in terms of understanding how to find information in libraries, and how well students compiled bibliographies and used references in assignments.

It is important to note that library instruction programs consisting of bibliographic instruction and user education/instruction evolved in the 1990s into information and digital information literacy programs (Lloyd & Williamson, 2008). In 1998, the ACRL Task Force on Academic Library Outcomes Assessment Report called for information literacy standards based on outcomes assessment.

Since the ACRL produced the Information Literacy Competency Standards for Higher Education in 2000, libraries began to evaluate the effectiveness of information literacy programs in terms of students' ability to demonstrate the desired information literacy skills and knowledge after working through programs. During the past several years (from 2000 onwards), there have been indications of assessing students' information literacy skills and outcomes assessment of information literacy programs.
A review of the literature, however, found little evidence of the evaluation of information literacy programs, which includes meaningful assessment of student learning through

outcomes assessment (Applegate, 2006:326 and McMillen & Deitering, 2007:62). Outcomes assessment is discussed in more detail in this chapter, section 4.3. The following table lists recent attempts of the assessment of information literacy skills in order to evaluate programs.

Table 4.3: Overview of the assessment of information literacy skills to evaluate programs

Author	Date	Evaluation
Rabine and Cardwell	2000	Practical approaches to outcomes assessment for libraries
Carter	2002	Outcome-focused assessment of library research instruction
Knight	2002	Mentions an online multiple-choice exercise at the end of a web-based tutorial to assess student learning outcomes
Mulherrin, Kelley, Fishman and Orr	2004	Outcomes assessment of a credit bearing online information literacy course
Samson and Granath	2004	Assess the effectiveness of an instruction program
Choinski and Emanuel	2006	Outcomes assessment for one-shot library instruction
Blakesley Lindsay, Cummings, Johnson and Scales	2006	Assessing online information literacy tutorials
Emmett and Emde	2007	Assessing information literacy skills using the ACRL standards as a guide to assess a measure for an instructional program
Samson and McLure	2007	Library instruction assessment - a 360° analysis
Tancheva , Andrews and Steinhart	2007	Pilot-tested three methods of assessment for the library instruction program - attitudinal, outcomes-based and gap-measure
Diller and Phelps	2008	Authentic assessment of an information literacy program
Furno and Flanagan	2008	Research attempt to determine whether students retain knowledge from a single information literacy training session
Tronstad, Phillips, Garcia and	2009	Assessing the *Tutorial for Information Power*

Author	Date	Evaluation
Harlow		information literacy tutorial, correlating the amount of time spent with scores

(The full bibliographic details of the above-mentioned sources can be found in the bibliography).

The next section will discuss the outcomes assessment research listed in the above-mentioned table, Table 4.3.

4.2.1 Approaches to outcomes assessment (Rabine and Cardwell)

Rabine and Cardwell (2000:320) used two assessment tools to establish what students were learning from their program. Firstly, a student library skills assessment survey was used to test whether students

- can recognise citations for different information sources.
- know how to use Boolean operators.
- can recognise primary and secondary sources.
- know the difference between popular and scholarly journals.
- can use the catalogue, *etcetera.*

Secondly, an assessment was done for one-shot library instruction sessions which included a post-test exploring what students were learning, as well as surveys given to students and course instructors at the end of the session to see if the appropriate material was presented. It also included a peer- and self-assessment tool. This outcomes assessment research enabled the authors to set manageable outcomes, design tools to measure the outcomes and modify their instruction and program, based on the information gathered from the assessment tools.

4.2.2 Outcome-focused assessment of library research instruction (Carter)

Carter (2002) used pre- and post-tests, attitude and usage surveys and focus groups for outcomes assessment of library research instruction. Firstly, the author tried to establish what Psychology students were learning about library research. The focus was on students' ability to search the literature and find an article on a specific topic and, secondly, to establish if their attitude towards research changed over the course of the semester. A pre- and post-test assessment using a free-response-key, together with attitudinal and usage measures, were used.

The effectiveness of instruction of a one-time library instruction course for first-year students, introducing them to library research, was also assessed. The pre- and post-test and attitudinal and usage measures used for the Psychology students were adapted. Two questions were used to ask students to describe steps they would take to find a book and journal on a designated topic.

A once per semester, one-credit one hour-course, required for all first-year students devoted to research instruction was also assessed using pre- and post-testing in the class. A free response test as well as an attitude and a usage survey were used. The research instruction included the narrowing of topics, search strategies, searching for a variety of sources, evaluating the sources for accuracy, relevance and appropriateness, and using references.

Following this, the assessment changed to focus group interviews to query students on their selection of sources, search techniques and success in finding material. From the outcomes assessment, the library learned what improvements could be made to their instruction.

4.2.3 Assessment of library instruction (Knight)

Knight (2002) assessed the impact of class-room and online bibliographic instruction on first-year students' information skills and self-confidence. Their instruction included a workshop covering library instruction, the distinction between scholarly and popular sources, the use of specialised encyclopaedias, online catalogues and periodical databases, which was supplemented by an interactive online tutorial. The following were used for the assessment:

- An online multiple-choice exercise at the end of the web-based tutorial that measures students' learning of the information contained in each section.
- A printed pre-test measuring students' library knowledge, previous research experience and a survey of students' self-confidence in the use of the library.
- A worksheet that is completed during the instruction session to immediately apply the skills they had learned.
- A printed post-test, replicating the pre-test, for skills and self-confidence assessment, which is administered at the end of the semester.

According to Knight (2002:19-20), the information can be used to configure class-room and online instruction and also to refine the design of future assessment methods.

4.2.4 Outcomes assessment of an online information literacy course (Mulherrin et al.)

Mulherrin *et al.* (2004) attempted to ensure that students show an understanding of the course content and achieve at least two of the basic information literacy objectives as set by their School of Undergraduate Studies, namely that the student should be able to

- determine the nature and extent of the information needed.
- access the needed information effectively and efficiently.
- evaluate information and its sources critically.

- incorporate selected information into his/her knowledge base.
- use information to accomplish a specific purpose.
- understand the economic, legal and social issues surrounding the use of information.

A post-test was originally used where the questions were mapped to the course material to evaluate the students' mastery of the content and the information literacy objectives. The post-test alone did not provide any data on how much students learned by taking the information literacy course and a pre-test was developed, mirroring the post-test, to examine where students showed improvement. Measures were also taken to ensure the validity and reliability of the questions.

Based on the results of the assessment, they concluded that presenting an online course for teaching information literacy skills is a very successful method for teaching students. However, the assessment findings must be used to improve the course. An introduction to online learning – prior to the student taking of the course – is essential, and systematic assessment tools must be developed to assess student learning.

4.2.5 Assessment of the effectiveness of an instruction program (Samson and Granath)

Samson and Granath (2006) describe a research project based on a comparative analysis of randomly selected sections of English composition that include library research components such as the ability to find information, evaluate information sources and use quality sources to write and present research effectively. The project used online instruction modules and implemented and analysed a multiple-choice web-based assessment tool using pre- and post-tests, literature cited analyses, as well as grade comparisons in an effort to identify and assess effective pedagogy for research instruction provided to students.

The results indicated that learning was taking place and that students complete the

research components with scores that reflect research skills that meet the goals of the library instruction program appropriate for entry-level and advanced students. The assessment further assisted in the revision, improvement of, and changes to the library research instruction program.

4.2.6 Outcomes assessment for one-shot library instruction (Choinski and Emanuel)

Choinski and Emanuel (2006) created an objective, quantitative, easy to use and flexible outcomes assessment tool for one-shot library instruction classes. The outcomes assessment tool is a one-minute paper, called the half sheet response. The technique involves asking students to write brief answers to specific questions during the last few minutes of instruction, providing feedback from the lesson of the day.

This paper describes an approach to assess how well students are learning and is therefore useful for assessing outcomes in a one-shot library instruction class. The authors suggested that ACRL-defined outcomes can also be measured with the one-minute paper. The feedback was used to improve the teaching, showing exactly where focus was needed in their instruction efforts.

4.2.7 Assessment of online information tutorials (Blakesley Lindsay et al.)

Blakesley Lindsay *et al.* (2006) embarked on an assessment program to measure the use and effectiveness of online tutorials where literacy competency standards of the ACRL were well presented. The tutorials provided information about accessing particular resource types such as the OPAC and books. Online tours and a ProQuest and NetLibrary tutorial were also included.

Students viewed some of the tutorial products and were then asked to perform tasks using the tutorials. They answered a number of questions designed to gather information about attitudes, usage patterns and perceptions of library resources and

services.

The results of the assessment project made it difficult to determine whether student learning was successful and students also suggested an increase in the interactivity of the tutorials. The recommendations by the students, and what the authors inferred from their reactions to the tutorials, were used to revise the tutorials.

4.2.8 Assessment of information literacy skills using the Association of College and Research Libraries' (ACRL) standards as a guide (Emmett and Emde)

Emmett and Emde (2007) obtained evidence of the effect of a curriculum designed to foster information literacy skills in graduate students in a chemistry bibliography course. The ACRL's Information Literacy Competency Standards for Higher Education (2000) were used as a basis to construct the assessment tool. The tool was administered at the beginning and end of a semester, using a pre- and post-test.

The assessment results indicated improvements in the average student score from the pre- to the post-test, with evidence of skills development over the course of the semester for specified outcomes.

The results indicated that the application of the ACRL's Information Literacy Competency Standards for Higher Education (2000) to the development of an assessment tool, course content and exercises proved to be a very valuable component in the design of a bibliography class for graduate students. However, the development of a more precise assessment tool will increase the validity and reliability of the results. The valuable assessment data can further advise in the modification of class content.

4.2.9 Library instruction assessment (Samson and McLure)

Samson and McLure (2007) used a 360° assessment embedded in the library instruction program, which includes

- formative assessment to assist in the development of instructors.
- the evaluation of teaching effectiveness by both the student and instructor.
- teaching portfolios to provide librarians with the opportunity to develop and articulate their abilities as instructors.
- the assessment of the library instruction program, by using a web-based post-test at the end of one-shot classes.

The assessment data gathered from the web-based post-test was used to implement change within the program and to build collaborative alliances with the teaching faculty, and the program itself could be used as a marketing tool for the library.

4.2.10 Pilot-test of three methods for assessment of a library instruction program (Tancheva, Andrews and Steinhart)

Attitudinal, outcomes-based and gap-measure were used to determine key areas of improvement for a library instruction program. The attitudinal assessment, using a focus group and a survey assessment, has guided program improvement in areas of marketing and user satisfaction, but does not provide the measurement of learning that is covered by outcomes-based assessment.

The gap-measure assessment provides a view of patrons' and instructors' attitudes toward learning outcomes, using a web-based survey distributed to patrons participating in information literacy workshops and also pre- and post-session interviews with instructors (Tancheva, Andrews & Steinhart, 2007:29).

Outcomes-based assessment is difficult to achieve in a single-session, short-term

instruction. However, a pre-test survey and a tutorial assignment which served as a post-instruction assessment tool were used in an effort to pilot-test an outcomes-based assessment of the library instruction program. The results of the outcomes-based assessment have provided an actual overview of the knowledge and skills of one sample group and have indicated that more attention should be given to helping students with their searching skills.

4.2.11 ePortfolio and rubrics assessment of an information literacy program (Diller and Phelps)

Diller and Phelps (2008) reported on a method of assessing a program based on university learning goals. The assessment methods rely on an electronic portfolio (ePortfolio) together with rubrics to evaluate work in the ePortfolio. Portfolios allow access to a collection of self-selected student work and self-reflection organised around defined learning goals, one of which is information literacy.

Rubrics, written according to ACRL standards, gave a clear measure of the level of the learning attained by students. According to Diller and Phelps (2008:78), this method of assessing information literacy is a holistic evaluation of a student's experience of information literacy, rather than the measurable skills associated with information-seeking practices.

This assessment collects longitudinal data about students' progress on the information literacy goal over four years and as a result the library's instruction program can be changed in response to this data, to improve student learning.

4.2.12 Assessment of a one-shot information literacy session (Furno and Flanagan)

Furno and Flanagan (2008) attempted to determine whether students retain knowledge from a single information literacy training session and to establish if there are other competencies that need to be covered in a 60-minute information literacy session.

Pre- and post-questionnaires were designed to measure information literacy learning outcomes that included the formulation of search strategies, evaluation of resources and the identification of information resources.

The results showed a number of areas where the information literacy training session could be improved to make better use of the 60 minutes. An example is the usage of the Boolean operators and the evaluation of information sources. Their assessment also created an opportunity for continued quality improvement of the information literacy program.

4.2.13 Assessment of the Tutorial for Information Power (TIP) information literacy tutorial (Tronstad et al.)

Tronstad *et al.* (2009) reported on the results of a study that assessed whether students were learning information literacy concepts after working through an interactive online tutorial. Pre- and post-tests were used to assess the students' learning.

This study also established a correlation between the amount of time students spent reading and interacting with the tutorial and results of the post-test. Students who spent more time working through the tutorial had a statistically significant increase from their pre-test to their post-test scores.

The results led to the authors' acknowledgement that improvements, corresponding with the TIP tutorial, could be made to the information literacy test. According to the authors,

it is often difficult to create multiple-choice questions that will effectively test all of the ACRL's Information Literacy Competency Standards for Higher Education (2000). A possibility for improving further questions for the test would be to adapt questions where answers vary from the most correct to the least correct.

In summary, most of the outcomes assessment research made use of surveys or post-tests but also both pre- and post-tests. The use of a survey or post-test *only* failed to measure the actual student learning taking place, thus hampering the process of judging the effectiveness of the program.

Most of the research was carried out to improve the program and not to determine the actual effectiveness. Only Emmett and Emde's (2007) assessment tool and Diller and Phelps' (2008) rubric used the ACRL's Information Literacy Competency Standards for Higher Education (2000) as guidelines in developing the assessment tool.

Furthermore, only Mulherrin *et al.* (2004) took measures to ensure the validity and reliability of the questions in the assessment tool, while Emmett and Emde (2007) mentioned that the development of a more precise assessment tool would increase the validity and reliability of the results.

Also interesting to note is the student populations used in the above-mentioned research. It was not specifically focused on a certain student profile as in the case of the DILP, which was designed, developed and adapted with the South African student in mind, belonging to Generation Y and Z. Most of the research focused on first-year or undergraduate students, students taking an information literacy class offered by the library or students taking specific subjects, for example, Chemistry, Spanish, Biology, English, *etcetera.*

Although the literature includes examples of the usage of outcomes assessment of student learning in order to evaluate information literacy programs at the libraries of higher education institutions around the world, *nothing has been reported in South*

Africa. Only a few examples discussed in the literature, refer specifically to outcomes assessment tools written according to the ACRL's Information Literacy Competency Standards for Higher Education (2000) or to proven validity and reliability.

Outcomes assessment will be introduced in the following section.

4.3   Outcomes assessment

Emmett and Emde (2007:211) state that the assessment of outcomes is an essential activity in the evaluation of library instructional programs. Hernon and Dugan (2002:66) state that outcomes focus on the competencies students master as a result of the program - in this case digital information literacy skills.

"Assessment is the activity of measuring student learning" (Sharpless Smith, 2010:185). Outcomes assessment is therefore the activity of investigating the effectiveness of learning intervention programs to bring about change among library users.   The program is the digital information literacy program, the change is improved digital information literacy skills and the library users are the students.

Outcomes assessment concentrates on what the students learned from the program (Rabine & Cardwell, 2000:320). Stern and Kramer (1992) further state that outcomes assessment provides a method of evaluating educational programs and looks at the results to measure changes in performance (Warner, 2008:xi).

Outcomes assessment essentially consists of establishing actual student learning from using the program by

- describing the skills students need to demonstrate after completion of a program.
- assessing the actual student learning outcomes (Washington State University, 2010?:n.p.).

The evaluation of the effectiveness of the DILP, by using an outcomes assessment instrument, had a four-pronged approach, namely

- describing the skills students need to demonstrate after completion of the program (see Appendix D, Skills to be demonstrated by students).
- developing the assessment instrument (see Chapter 5, section 5.5, Design of data collection instruments).
- assessing the actual student learning (see Chapter 6, section 6.4, Presentation of data and interpretation).
- evaluating the effectiveness of the program (by summarising test mean scores of students which will accurately show the impact of the program – therefore determining the effectiveness of the program, see Chapter 6, section 6.6, Judging the effectiveness of the DILP).

To do an outcomes assessment of students' learning, assessment instruments or assessment tools are needed. According to Warner (2008:xiv), some assessment instruments such as *iSkills-Information and Communication Technology Test* and *Project SAILS/Standardized Assessment of Information Library Skills* do exist, but they cannot be used as "one size fits all". Outcomes assessment instruments and the development thereof are discussed in Chapter 5, section 5.5.

4.4   Summary

This chapter provided an outline of the evaluation initiatives by academic libraries. As mentioned in 4.1 Introduction, the reason for evaluation is to determine the effectiveness of a training program such as the DILP. A review of the library literature suggested that there is sufficient research on the effectiveness of library instruction programs, specifically where bibliographic instruction such as using the catalogue, general user education and students' opinions about the programs are concerned.

It is, however, important to note that these library instruction programs, consisting of

bibliographic instruction and user education/instruction, evolved into information and digital information literacy programs (Lloyd & Williamson, 2008). As mentioned earlier, the ACRL Task Force on Academic Library Outcomes Assessment Report called for information literacy standards based on outcomes assessment in 1998.

A review of the literature found *no evidence* of the evaluation of the effectiveness of information literacy programs or digital information literacy programs which includes meaningful assessment of student learning through outcomes assessment in South Africa.

Due to this lack of published research, an evaluation to gauge the effectiveness of the DILP by using outcomes assessment of student learning was undertaken. This was by done by developing an outcomes assessment instrument, namely a pre- and post-test, which is reliable, valid and maps to the Information Literacy Competency Standards for Higher Education of the ACRL.

The following chapter, Chapter 5, will discuss the quasi-experimental research phase and also includes the development of the outcomes assessment instrument.

Chapter 5

The quasi-experimental research phase

5.1   Introduction

The quasi-experimental research phase refers to a design that resembles an experiment but is not exactly an experiment, as quasi means "having some but not all of the features" of an experiment (Jackson, 2009:317). As in the case of experimental research, quasi-experimental research involves the administering of a treatment, but participants are not randomly assigned to treatment (Mitchell & Jolley, 2007:443).

The purpose of this chapter is therefore to describe, comprehensively, the quasi-experimental design, the research approach, research methodology, design of the data collection instruments and data collection as applicable to the quasi-experimental research phase. This chapter also includes an explanation of evaluation research, the pilot study, validity and reliability, choosing the variables as well as ethical considerations.

The ACRL Institute for Information Literacy (2011) clearly states that one of the characteristics of information literacy programs that illustrate best practice is the evaluation of the program itself. According to De Vos (2002a:372), program evaluation is used when one feels compelled to evaluate an existing program. The DILP would be an example of such a program. Furthermore, program evaluation is one of the three types of research that utilise both quantitative and qualitative approaches (De Vos, 2002a:372).

By using the combined qualitative and quantitative approach, the research focused on Creswell's mixed methodology design model. This means that the research used mixed aspects of the qualitative and quantitative approaches which involve, for example, gathering both numeric information (on instruments such as the pre- and post-

tests) as well as text and verbal information (e-mail and telephonic interviews) (Creswell 2003:20).

The mixed methodology design model, according to De Vos (2002a:366), further offers the researcher the opportunity to mix the aspects of the qualitative and quantitative approaches at all or many methodological steps in the design. The following will further explain this statement:

- The research design used is a non-randomised quasi-experimental design, which is quantitative in nature.
- Describing the population is qualitative in nature.
- The selection of a sample is quantitative in nature.
- Pre- and post-tests used as an instrument of data collection, are quantitative in nature.
- Follow-up interviews, used as another instrument of data collection, are qualitative in nature.

The research design is "the plan according to which we obtain research participants (subjects) and collect information from them" (Welman, Kruger & Mitchell, 2005:53). The research design is presented in this chapter by discussing the quasi-experimental design. The specific type of quasi-experimental design used was the single-group pre-test/post-test design.

This was specifically chosen as it is an improvement on the single-group post-test design, since measures are taken twice (before and after the treatment) and the two measures can then be compared to determine the result of the treatment.

In a research design it is also important to specify the number of subjects that should be used and whether the group should be drawn randomly from the population involved or not, therefore the following were also specified:

- Population

- Sampling.

As mentioned in Chapter 1, section 1.3.2, the objectives of this study were sevenfold, namely to

- identify the demographics and characteristics of Generation Z, in order to incorporate this information in the existing DILP and therefore make the DILP applicable to and useful for both Generations Y and Z, since the DILP was originally designed and developed for Generation Y.

- identify and incorporate new technologies in the existing DILP.

- provide a historical outline of the evaluation initiatives by academic libraries, the evaluation of information literacy and digital information literacy programs and the evaluation of the effectiveness of digital information literacy programs using outcomes assessment.

- develop an outcomes assessment instrument.

- administer the instrument and analyse the quantitative data in order to determine the effectiveness of the program by measuring student learning.

- conduct telephonic and e-mail interviews in cases where there was a negative change in students' ability to answer post-quiz questions and analyse the qualitative data to assess the program and the outcomes assessment instrument.

- show how the program might be improved to be more effective in enhancing students' digital information literacy skills.

Some of these objectives were encapsulated by previous chapters, for example,

- identifying the demographics and characteristics of Generation Y and Z – Chapter 2

- integrating new learning technologies – Chapter 3

- providing the historical outline of the evaluation initiatives by academic libraries, the evaluation of information literacy and digital information literacy programs and the evaluation of the effectiveness of digital information literacy programs using outcomes assessment – Chapter 4.

The following objectives are discussed in this chapter:

- Developing an outcomes assessment instrument.

- Administering the instrument.

- Conducting telephonic and e-mail interviews in cases where there was a negative change in students' ability to answer post-quiz questions.

In summary, Table 5.1 shows which research methodologies were used to achieve the research objectives.

Table 5.1: Research objectives and research methodology

Research objective	Research methodology
Identifying the demographics and characteristics of Generation Y and Z	Analysis of reported research
Integrating new technologies with the DILP	Analysis of reported research
Providing a historical overview of the evaluation initiatives and the evaluation of the effectiveness of digital information literacy programs	Analysis of reported research
Developing the outcomes assessment instrument	Analysis of reported research and quasi-experimental research
Administering the instrument in order to determine the effectiveness of the program in terms of student learning by scoring the pre- and post-tests	Quasi-experimental research

Research objective	Research methodology
Conducting telephonic and e-mail interviews with identified students to determine possible problems experienced with certain post-quiz questions	Quasi-experimental research
Determining how the program might be improved to be more effective in enhancing students' digital information literacy skills.	Quasi-experimental research

Evaluation research – the research undertaken to investigate the effectiveness of the DILP – is discussed in the following section.

5.2   Evaluation research

As mentioned in Chapter 1, section 1.1, one of the characteristics that illustrate best practice for information literacy programs is the evaluation of these programs (ACRL, 2011). The evaluation of programs is done by doing evaluation research. Babbie (2010:363) defines evaluation research as "research undertaken for the purpose of determining the impact of some social intervention, such as a program aimed at solving a social problem."

The main element of all evaluation research is the program, in this instance, the DILP. Babbie (2010:365) states that "much of evaluation research is referred to as program evaluation". Babbie and Mouton (2001:335) also refer to evaluation research as program evaluation.

Rossi, Lipsey and Freeman (2004:28) define program evaluation as follows:

> Program evaluation is the use of social research procedures to systematically investigate the effectiveness of social intervention programs. It draws on the techniques and concepts of social science disciplines and is intended to be useful for improving programs.

Also important is Patton's (2002:10) definition of program evaluation as this includes

outcomes:

> The systematic collection of information about the activities, characteristics and outcomes of programs to make judgements about the program.

Program evaluation is therefore concerned with the outcomes of a program. When program evaluation is concerned with the outcomes of program it is called outcome evaluation (De Vos, 2005:381).

Outcome evaluation is thus the systematic investigation of the effectiveness of a program to produce change among library users, ensuring that the program produced the intended result (Hernon & Dugan, 2002:80). Mouton (2001a:160) further states that the main aim of outcome evaluation is to establish whether the intended outcomes of the program have materialised. In order to gauge the effectiveness of a program, skills must be assessed (Meyer, Hunt, Hopper, Thakkar, Tsoubakopoulos & van Hoose, 2008:22) - in this case, digital information literacy skills.

For the purpose of this study, an outcomes assessment was carried out to establish whether the program (the DILP) has been effective in producing change - that is improved digital information literacy skills - among the students.

Since outcome evaluation is a type of program evaluation, and much of evaluation research is referred to as program evaluation, one needs to refer to outcome evaluation research to determine the research design. Figure 5.1 shows how the above-mentioned merged into a whole.

Figure 5.1: Evaluation research
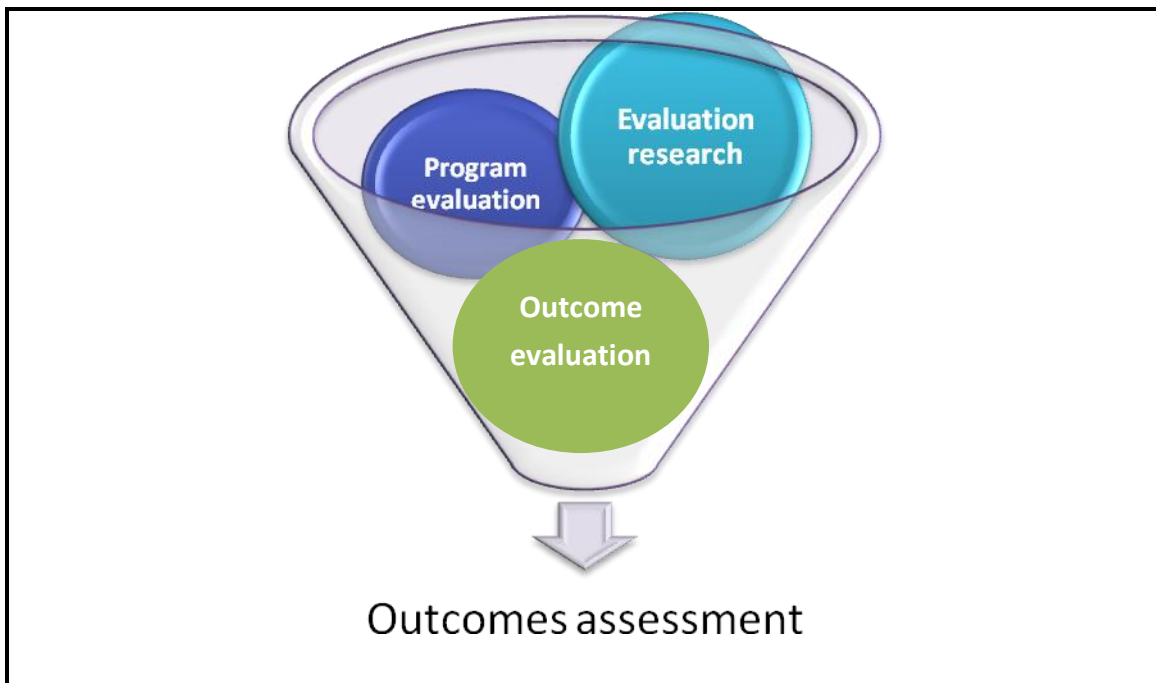
Babbie (2010:371), Hernon and Dugan (2002:87) as well as Mouton (2001a:160) state that experimental and quasi-experimental designs are types of designs used in outcome evaluation research. The preferred design would be a quasi-experimental design and is discussed in the following section.

5.3   Quasi-experimental design

A quasi-experimental design indicates a design that resembles an experiment but is not exactly an experiment. The design differs from experimental designs in that there is no control or comparison group, in other words, only one group is given a treatment and is then assessed (Jackson, 2009:317-318). This type of design is also widely used in educational research (Gribbons & Herman, 1997).

De Vos (2005:382) further mentions that occasionally it is possible to use classical designs, but for practical reasons it is necessary to use non-randomised quasi-experimental designs. Babbie (2010:371) states that this design is different from "true"

experiments, because it does not randomly assign subjects to an experimental group and is therefore non-randomised, which makes it relevant to use. It is often impossible to randomly assign participants in evaluation research and rather than to forgo evaluation, quasi-experimental designs are used.

Jackson (2009:320-321) lists various types of quasi-experimental designs, namely:

- Single-group post-test only
- Single-group pre-test/post-test
- Single-group time-series.

As mentioned in section 5.1, the single-group pre-test/post-test design was chosen as it is an improvement on the single-group post-test design, since measures are taken twice (before and after the treatment) (Jackson, 2009:321). The two measures can then be compared and differences in the measures are assumed to be the result of the treatment. Figure 5.2 illustrates the single-group pre-test/post-test design.

Figure 5.2: The single-group pre-test/post-test design
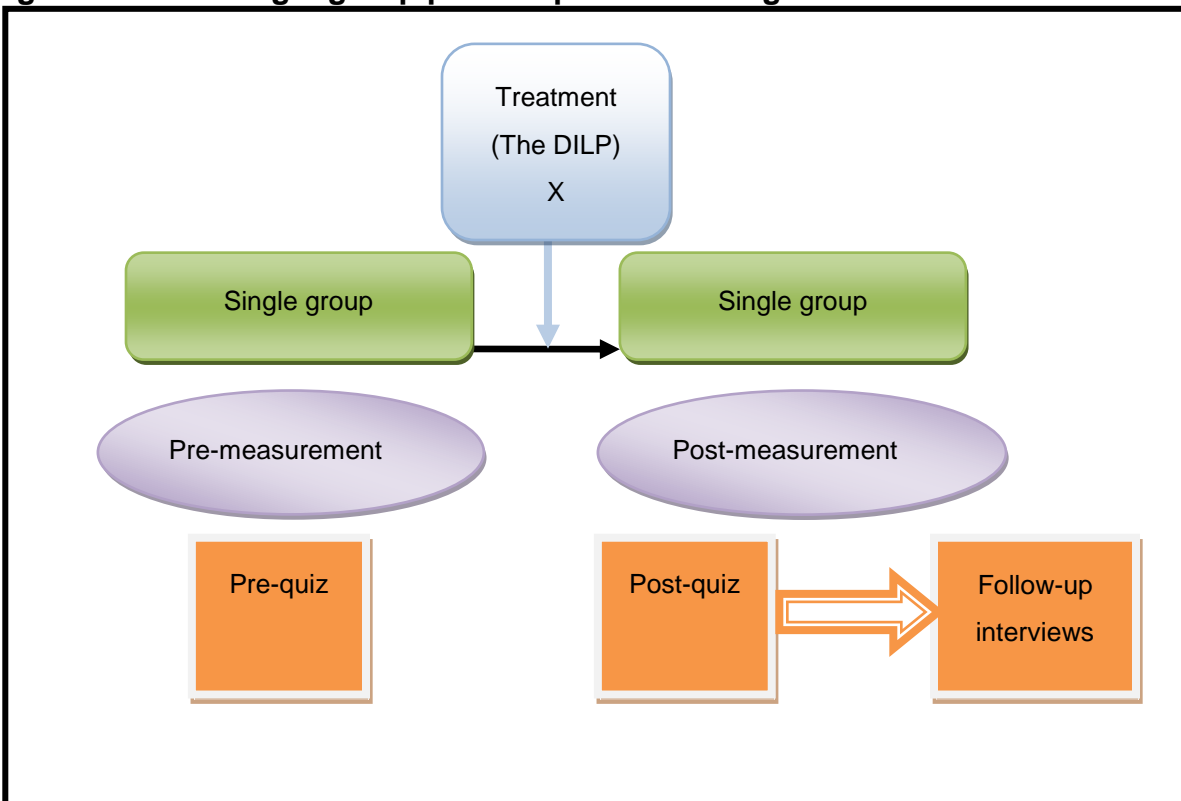
A challenge of using the single-group pre-test/post-test design is the lack of a control group, which exposes the design to threats to internal validity. These potential threats to internal validity need to be identified and ruled out to enable one to argue that non-treatment factors did not account for the change in participants' scores and that the treatment caused the effect (Mitchell & Jolley, 2007:444-445).

Campbell and Stanley (1963) discovered that these potential threats fall into eight categories and, rather than dealing with an immense number of threats to internal validity, one can focus on the following threats to internal validity:

- Selection

- Selection by maturation

- Mortality

- Instrumentation

- Regression

- Maturation

- History

- Testing.

The following section will show how the research dealt with the threats to internal validity.

5.3.1 Steps taken to minimise threats to internal validity

5.3.1.1 Selection

When dealing with selection, one should not use a design that involves comparing one group of participants with another (Mitchell & Jolley, 2007:447). This was automatically

eliminated because the participants were tested against themselves.

5.3.1.2 Selection by maturation

Selection by maturation refers to the situation in which one group of participants changes faster than another group in a given dimension (Ray, 2009:176). Selection by maturation was also automatically eliminated because participants were, once again, tested against themselves.

5.3.1.3 Mortality

Mortality refers to participants dropping out of the study. To control this threat, treatments were brief; it took the students approximately one and a half hours to complete the pre-test, work through the DILP and complete the post-test. The testing of the DILP itself was also conducted over a short period of time, namely one week.

Mitchell and Jolley (2007:447) further suggest the use of rewards to prevent mortality. Upon returning the informed consent form and the completed pre- and post-test, each student was given refreshments and a small token of appreciation. Refreshments were also served while the students were completing the tests and working through the program.

To further prevent students from dropping out, the researcher ensured that the students understood the instructions, to prevent them from being rejected for failing to follow the directions. Consequently, only 22 students out of the 510 dropped out.

5.3.1.4 Instrumentation

Mitchell and Jolley (2007:447) recommend that the instrument should be administered the same way every time. To make sure that this threat was dealt with, each student first had to sign the informed consent form, then do the pre-test, work through the

program and then complete the post-test, ensuring a standardised way in which the instruments were administered.

5.3.1.5 Regression

Regression is a potential threat to internal validity in a quasi-experiment if the researcher selects individuals for a group based on extreme scores, because they will naturally do better (or worse) in a post-test than the pre-test regardless of the treatment. This will threaten the validity of the outcomes (Mitchell, s.a).

To deal with this threat, the students were not selected based on extreme scores. Not only students who had an academic average of 75% or higher or 35% or lower were invited to take part in the study. The students who participated took part voluntarily and were not selected by the researcher. Students were invited by the distribution of an information leaflet on campus (see Appendix G, Information leaflet and informed consent form).

5.3.1.6 Maturation

Maturation is a treatment effect that is caused by natural biological challenges such as fatigue or hunger (Mitchell & Jolley, 2007:445). To prevent this, the research was conducted in a short period of time (it took the students approximately one and a half hours to complete the pre-test, work through the DILP and then complete the post-test, which is shorter than the two to three-hour examinations usually taken by students).

Another way of dealing with this threat was to minimise the time between the pre- and post-test. The students worked through the program immediately after completion of the pre-test and also completed the post-test immediately after working through the DILP. The post-test was completed about an hour after the pre-test.

5.3.1.7 History

History can pose a threat to internal validity when the group being studied experiences an event – unrelated to the treatment – that may be responsible for the results instead of the program itself (Martin, 1997). To deal with this threat, the students were isolated from external events by completing the pre-test, working through the DILP and completing the post-test in a laboratory assigned to the researcher for the duration of the study.

Another way to deal with history is to minimise the time between the pre-test and post-test and as mentioned in Section 5.3.1.6. The students worked through the program immediately after they completed the pre-test and also completed the post-test immediately after they worked through the DILP. The post-test was then completed about an hour after the pre-test.

5.3.1.8 Testing

In general, taking a test affects subsequent testing. Participants' performance, with respect to a measure at the end of the study, may therefore differ from an initial testing, not because of the treatment, but because they are familiar with the measure (PsychoMetrics, s.a.). The students can be sensitised to an issue in the pre-test and they may respond differently when asked the same question in the post-test.

To deal with this threat to internal validity, the researcher used similar but not identical pre- and post-tests to prevent the students from being "prepared" for the post-test by the pre-test itself.

After the researcher dealt with the threats to internal validity, a group of students, who belong to Generation Y and Z, completed a pre-test, worked through the DILP (the treatment) and completed a post-test to determine if there was an improvement in their digital information literacy skills. In cases where there was a significant difference in the

percentages of a specific pre- and post-test question, follow-up interviews were conducted.

The group of students mentioned here, belong to a specific population and this population will be discussed in the following section.

5.3.2 Population

This study concentrated on Generation Y and Z, therefore the population was students from Generation Y and Z. In South Africa, there are approximately 474 600 contact students (Department of Education, 2009:33) at the various higher education institutions. Higher education institutions in South Africa are grouped into three categories, namely

- "Traditional" universities

- "Comprehensive" universities (arising from mergers between traditional universities and technikons)

- Universities of Technology (created from merged and unmerged technikons) (Council on Higher Education, 2010:1-2).

Contact students are those who are registered mainly for courses offered in contact mode. They are more likely to fall into the age category of 32 years or younger, rather than distance and postgraduate students who may include students from older age groups.

Since it is impossible to involve all the Generation Y and Z students of the various universities, the university with the most contact students was therefore chosen. According to the Department of Education (2009:33), the university with the most contact students is the Tshwane University of Technology (TUT). The size of a population is indicated by *N* and is therefore *N*= 46 570, for all the campuses of TUT.

5.3.3 Sampling

Strydom and Venter (2002:199) state that a complete coverage of the total population is hardly ever possible and all the members of a population of interest cannot possibly be reached. For this reason, the usage of samples results in more accurate information and therefore only a portion of the population was used in the research. The size of the sample was determined by using the guidelines for sampling, offered by Stoker (as quoted by Strydom, 2005b:196), which are tabulated in Table 5.2.

Table 5.2: Guidelines for sampling

Population	Percentage suggested	Number of respondents
20	100%	20
30	80%	24
50	64%	32
100	45%	45
200	32%	64
500	20%	100
1000	14%	140
10 000	4,5%	450
100 000	2%	2000
200 000	1%	2000

(Stoker as cited by Strydom, 2005b:196)

Following these guidelines, the relevant data was inserted in an Excel line chart and is reflected in the following Figure 5.3.

Figure 5.3: Sample size
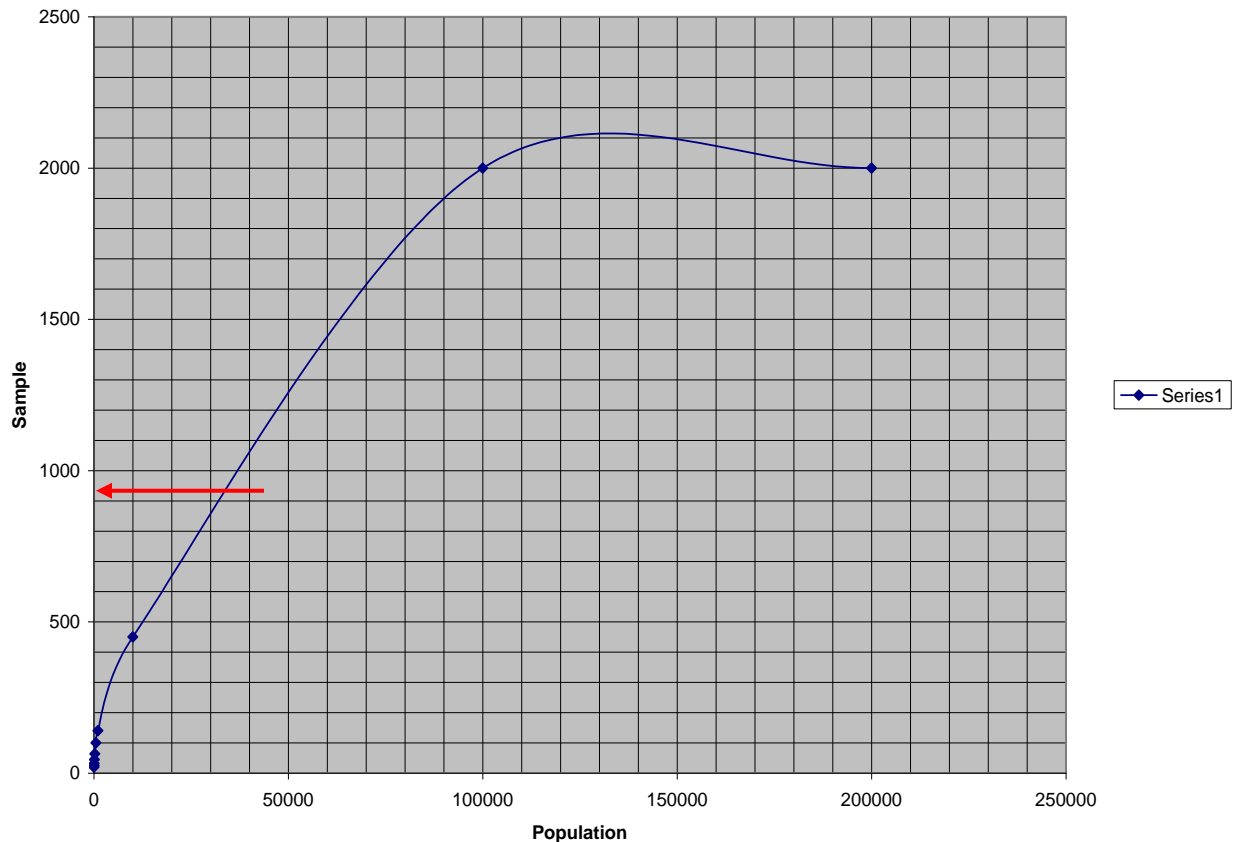
The red arrow in this figure indicates the sample size which is *n* = 931 for all the campuses of TUT. In sampling individuals for the research, the sampling method should be taken into consideration.

Non-probability sampling took place, as the Center for Program Evaluation and Performance Measurement (2011?:Non-probability sample) states that this is "a sample not produced by a random process". Non-probability sampling, according to Jackson (2009:96), is normally used because it tends to be less expensive and it is easier to generate samples using this technique.

The contact students (*N* = 46 570) of TUT generally represent the characteristics and representative attributes of the population: they are from Generation Y and Z and are 32 years or younger.

Furthermore, the Nelspruit Distance Campus of TUT is representative of the population (*N*= 46 570), as most of the 1756 students from this campus represent the characteristics and representative attributes of the population, namely being 32 years or younger and belonging to Generation Y and Z. For the purpose of this study, to be representative, a sample size of *n = 931* was needed.

Since the Nelspruit Distance Campus was willing to allow the researcher to make use of their resources, an attempt was made to get a sample size of *n = 931* from the approximate 1700 students on this campus. It was expected that the responses would not be a 100%; 510 students consequently took part in this study.

These students took part because the research project was publicised by the heads of the departments and lecturers who distributed the information leaflet and invited students to take part in the research project (see Appendix G, Information leaflet and informed consent form).

Self-selection sampling therefore occurred as 510 students identified their desire to take part in the research after the research project was publicised on campus. The sample size (*n = 510)* is considered sufficient. Welman, Kruger and Mitchell (2005:71) state that it is unnecessary to draw a sample larger than 500 as it will have little effect on decreasing the standard error and margin of error.

For the qualitative approach, particular students were selected deliberately in order to provide information that could not be obtained from other persons (Maxwell, 2005:88). More specifically, criterion sampling was used, which involves the selection of all cases that meet some criterion (Patton, 2002:238) – in this instance, all the students who performed worse in the specific post-quiz questions after working through the DILP. They were the only students who could provide possible reasons for problems and/or misunderstandings that students could have experienced with the specific question in the outcomes assessment instrument.

Thus, for the follow-up interviews, the researcher consciously selected certain respondents to be included in the study (Zeelie, 2004:120), based on the results from the quantitative research. The sample size depended on the number of students who failed to do better in the post-quiz than the pre-quiz, after working through the DILP. The sample size was therefore $n = 453$.

5.4   Research instruments

The research instruments, used for collecting the data for the quasi–experimental phase, are discussed in this section. For the purpose of this study, questionnaires and interviews were used. The questionnaires are the pre- and post-tests, used during data collection, and follow-up telephonic and e-mail interviews were also used, in cases where students performed worse in the post-test than the pre-test.

Walsh (2009) reviewed the library literature in order to provide an overview of the instruments used. He particularly reviewed the literature for the most popular instruments and those which show how reliability and validity of the instrument have been considered, as well as those mapping to the ACRL Information Literacy Competency Standards for Higher Education (ACRL, 2000). The ACRL Information Literacy Competency Standards for Higher Education provides a framework for assessing information literacy and lists a range of outcomes for assessing student progress towards information literacy.

His research discovered that multiple-choice questionnaires, in particular, are the most popular. The multiple-choice questionnaire is an instrument which is often chosen for convenience as it allows for

- Easy testing.

- Objectivity (in marking, there is usually only one correct answer).

- Ease of marking.

- Testing large groups.

- Developing items to test higher level intellectual skills (University of Technology Sydney, Institute for Interactive Media and Learning, 2007).

Considering the above-mentioned, it was decided to use the multiple-choice questionnaire as the preferred outcomes assessment instrument. For the purpose of this study the questionnaire will be referred to as the outcomes assessment instrument, since this study is concerned with the evaluation of the effectiveness of the DILP in enhancing the students' digital information literacy skills, by means of an outcomes assessment, as mentioned in Chapter 4, section 4.3.

Walsh (2009:22, 25) states that it is obvious from the literature that producing such a questionnaire is not easy. However, there are some examples of good practice showing, for example, reliability and validity. The examples are:

- Cameron, Wise, and Lottridge (2007) developed and validated an information literacy test.

- O'Connor, Radcliffe and Gedeon (2002) developed an instrument for the assessment of information literacy that is valid and credible.

- Ondrusek, Dent, Bonadie-Joseph and Williams (2005:388-417) also developed an information literacy test, incorporating a methodology to determine validity.

Interviews were used as a second instrument. The interviews were either telephonic or *via* e-mail. This is discussed in more detail in section 5.5.4.

The purpose of the following section is to describe the design of a valid and reliable outcomes assessment instrument, where the questions are mapped to the specific information literacy outcomes as set out by the Information Literacy Competency Standards of the ACRL (2000) and the Information Literacy Standards of CAUL (2001). Validity can be ensured by, for instance, asking other librarians to determine whether the questions are mapped to the chosen ACRL and CAUL standards and their

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outcomes. Validity and reliability are discussed in more detail in section 5.7.

5.5   Design of data collection instruments

The questionnaires for this study are the actual pre- and post-test used during data collection. The design of the pre- and post-test will be discussed by focusing on

- test and question construction.
- test scoring and analysis.
- mapping the questions to the ACRL and CAUL standards and outcomes (see Appendix C, Content validity of pre- and post-test for the evaluation of the Digital Information Literacy Program (DILP) with comments from information literacy experts. Content validity will be indicated by discussing the changes suggested by information literacy experts from South Africa and abroad, and is included Appendix E, Mapping of questions to standards and outcomes with evidence of validity, based on expert ratings of the items).
- testing the preliminary drafts of pre- and post-test.

5.5.1   Test and question construction

The tests were designed to measure the learning outcomes of students in order to evaluate the effectiveness of the DILP. From the results gathered, the overall effectiveness of the DILP was inferred. The advantages of tests are that one can measure how much students know at the end of the program and how much improvement has been brought about by the program itself (Alessi & Trollip, 2001:555).

Ondrusek *et al.* (2005:394) suggest that objective tests should be used. Objective tests are tests containing factual questions that can be quickly scored with an answer key, therefore minimising subjective judgements by the person taking the test and the person scoring it (Dictionary.com, 2011). The pre- and post-test were scored with an answer key (see Appendix F, Digital information literacy pre- and post-quiz and answer and

scoring sheets).

There are many creative types of assessment questions which can be used in tests: using answer keys, for example, multiple-choice, fill-in-the-blank, true/false, matching, completion and sentence stems (Ondrusek *et al.*, 2005:394 and Smith, 2005:95). The majority of the questions were created as selected-response items using multiple-choice and true/false. Welman, Kruger and Mitchell (2005:176) further state that selected-response items are easier to use since one can compare the different responses of the students.

Other types of questions, such as matching formats (Questions 6, 18 and 27), were also included and one short-answer question (Question 12) took the form of a constructed-response item (see Appendix F, Digital information literacy pre- and post-quiz and answer and scoring sheets).

Certain guidelines were followed in the construction of effective selected-response questions. The questions reduced the likelihood of passing the test by guessing. Multiple-choice questions, for instance, had four possible responses as this reduces the probability of a correct guess to 25% (Ondrusek *et al.*, 2005:394) – the same goes for the matching exercise questions.

Important rules for writing effective test questions were also followed and are discussed here. As the multiple-choice question is a selected-response format, it consisted of

- a stem – the text of the question.
- options – the choices provided after the stem.
- the key – the correct answer.
- distractors – the incorrect answers (McKenna & Bull, 1999:2).

There was only a single correct answer and the distractors were consistent with the correct response in length, vocabulary and difficulty (Ondruksek *et al.* 2005:395-397).

The true/false items are also presented in the form of selected-response. The multiple-choice questions as well as the true/false questions included an "I don't know" option as this discourages guessing, as suggested by Neely and Ferguson (2006:153).

Matching items required students to match a series of stems to a response. These items consist of a set of directions, a column of statements and a column of responses (McKenna & Bull, 1999:11). Matching items can assess a student's ability to apply knowledge by requiring the student to match, for example, parts. When writing matching questions the following are important:

- Directions should be clear.
- Information in each column should be similar.
- The list of responses should be arranged systematically.
- More responses than stems should be included to prevent students from using a process of elimination to answer the question (McKenna & Bull, 1999:13).

Constructed-response items required a student to supply an answer to a question. An advantage of this type of question is that the student must supply the correct answer rather than choose it and it therefore reduces the chances of the students guessing the correct answer.

Another important factor to take into consideration with pre- and post-test is that of using pre- and post-tests that are identical. Daugherty and Carter (1997) mention that, by using an identical pre- and post-test, one is preparing the students for the post-test by the pre-test itself: therefore, the pre- and post-test were not identical, but similar (see Appendix F, Digital information literacy pre- and post-quiz and answer and scoring sheets).

The components of the questions varied, but not the general structure of the question. In the post-test, some questions stayed the same, but different choices were provided, for instance, after the stem. In cases where a student was asked, for example, how

he/she would find information on a certain topic, the topics were changed, as suggested by Emmett and Emde (2007:213).

5.5.1.1 Physical format of the pre- and post-test

A paper format was chosen, as the researcher tried to avoid technological problems with online tests. Connectivity, for instance, can be one problem: inactivity from a student's side while taking the tests can cause the student's connection to be dropped. The network may also be down or too slow. Slow load times can frustrate the students and they may turn off the computer and leave. Access to enough working computers was also a concern.

Andrew (2009) also pointed out that students need prior exposure to taking tests in a computerised environment, as unfamiliarity with this format might result in anxiety. The information leaflet (see Appendix G, Information leaflet and informed consent form) indicated that the completion of the questionnaire does not involve any foreseeable physical or emotional discomfort or inconvenience.

5.5.1.2 Language

English was used for both the pre- and post-test as English is the medium of instruction at most universities, including the Tshwane University of Technology. The digital information sources used by students as well as the DILP are also in English, therefore the pre- and post-test matched the language of instruction and the digital information sources.

5.5.1.3 Length

The pre- and post-test comprised 30 questions each. A preliminary draft, which was tested on a sample of students, indicated that the tests took about 30 minutes each, on average, to be completed (see also section 5.6.2).

5.5.1.4 Instructions

It is important to ensure that the instructions are clear and unambiguous. These were resolved with the preliminary draft of the tests. Bold typeface and underlining were used in the instructions for both the pre- and post-test.

5.5.2 Test scoring and analysis

Kruse (2004) states that after the students completed the pre-test and post-test, and the test items or questions were set according to the outcomes, the researcher can then count the scores of all students and compare the pre- and post-test responses to accurately see the impact the training intervention (the DILP) had on the students.

The pre- and post-tests were therefore scored to compare the average score of the students in the pre-test to the average score of the students in the post-test. An answer key and scoring sheet (see Appendix F, Digital information literacy pre- and post-quiz and answer and scoring sheets) for both the pre- and post-test were used. Most questions had a possible score of one, since only one answer could be correct, except for the following questions in the pre- and post-test:

- Question 6, which is a matching question (score = 4)
- Question 18, which is a matching question (score = 4)
- Question 27, which is a matching question (score = 4).

The highest possible score that could be assigned was 39. The extent of improvement from the pre-test to the post-test reflected the impact the program had on the acquisition of digital information literacy skills. The analysis focused on analysing the data for each dependent variable.

5.5.3 *Mapping to the ACRL and Council of Australian University Librarians' (CAUL) standards and outcomes*

As mentioned in Chapter 1, section 1.3.1, standards can be applied to assist in the identification of appropriate outcomes and to design outcomes assessment instruments. These standards refer to information literacy standards. In 2000, the information literacy competency standards were created by the ACRL (2000) and still serve as the benchmark for information literacy programs.

CAUL adopted these in 2001 and added two more standards to the five standards of ACRL. For each standard there are listed outcomes and, as already mentioned, these can be used to design outcomes assessment instruments. The various units of the DILP were written according to a combination of the ACRL and CAUL standards, since CAUL includes two more standards, namely that the information literate person should be able to

- classify, manipulate and redraft the information collected or generated.
- recognise lifelong learning.

Outcomes of the standards were applied in creating the content, exercises and quizzes for the DILP. The standards and selected outcomes from the ACRL and CAUL as well as the specific outcomes as set out in the units of the DILP are depicted in Appendix B, Standards, outcomes and DILP specific outcomes.

Cacha and Abdullah (2008:209) state that these outcomes serve as guidelines for the development of assessment instruments and Emmett and Emde (2007:211) point out that the outcomes mentioned in the standards should be used in the construction of assessment questions. Kruse (2004) and Hoffman (2002) further explain that, in order to measure results, one should ensure that the questions in the pre- and post-test are set according to the outcomes. The questions for the tests were therefore written according to outcomes as set out in the DILP which were based on the outcomes of the

ACRL and CAUL.

There are 21 outcomes which are set out in the different units of the DILP. The figures in Appendix E, Mapping of questions to standards and outcomes with evidence of validity based on expert ratings of the items, illustrate how the questions were mapped to the ACRL, CAUL and the DILP outcomes. When a new data collection instrument is designed, it is useful to test it prior to the actual research effort (Babbie, 2010:267). This is discussed in section 5.6.

5.5.4 Design of the question sheets for follow-up interviews

The question sheets for the follow-up interviews were created to gather the students' opinion on some of the questions in the outcomes assessment instrument as well as the DILP itself. These were the questions where the students failed to answer the post-test question correctly, but answered the pre-test question correctly. Nine questions were identified, namely Questions 2, 5, 6b, 16, 17, 19, 22, 27c and 27d. These specific questions from the outcomes assessment were identified after the quantitative data from the DILP testing had been analysed.

The question sheets for the follow-up interviews contained three questions (see Appendix H, Follow-up interview question sheets). The questions were open-ended questions, asking the students to provide their answers to the questions. The question sheets for the follow-up interviews were in English as this is the language of instruction at the TUT.

The follow-up interviews were done by telephoning the students, and if the e-mail addresses of the students were available, the question sheet was then e-mailed to the students.

5.6   Pilot study

The pilot study involved the testing of the preliminary drafts of the pre- and post-test. The purpose of pre-testing the tests was to protect against errors such as ambiguous questions, spelling mistakes, unclear instructions or questions and inadequate time limits, as well as errors in the functioning of the independent variable (the DILP).

5.6.1 Ensuring content validity

In an effort to ensure that the pre- and post-test were considered sufficiently reliable to be administered, information literacy experts and a statistician were also asked to read through, assess and comment on the pre- and post-test, answer keys and scoring sheets. Each question, from both the pre-test and post-test, was presented in figures and the information literacy experts had to rate the extent to which the question matched its purported outcome, using one of the three rating categories: "Matched the outcome", "Uncertain" or "Did not match the outcome".

The input from the literacy experts and statistician assisted the researcher to determine whether the questions were truly mapped to the chosen ACRL and CAUL standards and their outcomes, therefore ensuring content validity of the tests (see Appendix C, Content validity of the pre- and post-test for evaluation of the Digital Information Literacy Program (DILP) with comments from information literacy experts).

The first information literacy expert was an information literacy training librarian from a university in South Africa, who was also responsible for the implementation of the information literacy training program at the specific university. She has a postgraduate degree in the multimodal transfer of literacy skills.

The second information literacy expert is an e-resources librarian at a university in the United States of America. She has an M.A. in Library Science and provides instruction for a variety of academic programmes at the university. She is also the co-author of a

peer-reviewed article on the assessment of information literacy skills.

The third information literacy expert is a scholarly communication librarian, also from a university in the United States of America. She has an M.L.I.S postgraduate degree and teaches a one-credit chemistry course at the university and has an ongoing interest in innovative projects that address current issues in scholarly communication. She is the co-author of a peer-reviewed article on the assessment of information literacy skills using ACRL standards.

Following their assessments of the pre- and post-test, their comments and suggestions for corrective actions were incorporated by changing a number of questions (see Appendix E, Mapping of questions to standards and outcomes with evidence of validity based on expert ratings of the items, as well as Appendix C, Content validity of pre- and post-test for the evaluation of the Digital Information Literacy Program [DILP] with comments from information literacy experts).

5.6.2 Pre-testing the tests

The tests were administered to five students for whom the eventual project was intended, that is students from the Generation Y and Z population. Only five students were used, as Nielsen (2000) states that the relationship between the cost of testing and the value of the benefit that results from the testing provides the optimal ratio with three or five users.

Rather than asking the students to read through the questions to identify possible errors and to determine whether they understand the questions, they had to complete the pre-test, work through the DILP and then complete the post-test, therefore simulating real life conditions. The pre- and post-tests were also marked using the answer key and the results were entered onto the scoring sheet. Table 5.3 shows the results of the completed pre- and post-test.

Table 5.3: Results of students for the pilot study

Student	Pre-test	Post-test
Student 1	82	84
Student 2	82	82
Student 3	69	100
Student 4	70	80
Student 5	69	67

Three of the students showed an improvement in their post-tests after working through the program, one showed no improvement and one scored lower in the post-test. This gave an initial indication that the program might improve digital information literacy skills and that there could be a variation in results.

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During the pilot study, the following observations were made:

- Students should be briefed in terms of what is expected from them, by giving clear instructions.

- Students thought they had already completed the test upon the presentation of the post-test as it looks similar to the pre-test.

- Explaining the process to be followed (first complete the pre-test, then work through the DILP and then complete the post-test) and the differences in the tests were important. This is also addressed in section 5.3.1.3 of this chapter.

- An Internet connection and sound should be available when students work through the program, in order for the students to do the exercises and view the informative videos.

- The DILP should be on the loading page before the students start working through the program, otherwise they start on whichever page is on screen and may skip some of the units in the DILP.

Concerning the tests, the following actions were taken:

- Identified spelling mistakes were corrected.

- The pre- and post-test were made more uniform, for example, the multiple-choice options following each question were all changed to start with capital letters.

- Some instructions in the tests were simplified.

- Some wording was changed: the word "tribe" was, for example, replaced with "culture" in the tests as "tribe" might be offensive.

The researcher could also get an indication of the approximate time it would take the students to work through both the tests and the program. This was necessary to plan the administering of the tests and to include this information in the information leaflet (see Appendix G, Information leaflet and informed consent form).

Errors in the functioning of the DILP were also corrected, for example some hyperlinks were inactive and some of the embedded videos did not show.

5.7   Validity and reliability

For the outcomes assessment instrument (the pre- and post-test) to be of any value, it must show validity and reliability (Ondrusek *et al.*, 2005:402). It was therefore important to determine the validity and reliability of the pre- and post-test. These terms are defined and the measures taken to ensure validity and reliability are discussed next.

Validity is a measure of the truthfulness of a measuring instrument. It indicates whether the instrument measures what it claims to measure (Jackson, 2009:70). The specific validity which was used was content validity which involves a systematic examination of the test content – that is the content of the pre- and post-test.

Reliability is an indication of the consistency or stability of a measuring instrument

(Jackson, 2009:65). Alternate-forms reliability was used, meaning that alternate forms of the testing instrument were used to correlate the performance of individuals in the two different forms (the different but equivalent pre- and post-test).

To ensure validity and reliability, the following measures were taken:

- Information literacy experts from South Africa and abroad were asked to determine whether the questions in the pre- and post-test are truly mapped to the chosen ACRL and CAUL standards and their outcomes, therefore assessing the **content validity** (see Appendix C, Content validity of pre- and post-test for the evaluation of the Digital Information Literacy Program (DILP) with comments from information literacy experts).

- The pre- and post-test are different but equivalent: they have the same number of items, the same level of difficulty and the same instructions and format, which ensure **alternate-forms reliability**. Alternate-forms reliability also controls test/re-test problems where the potential for memorisation of the test, if the exact same test is used for the pre- and post-test, is eliminated (Jackson, 2009:68), (see Appendix F, Digital information literacy pre- and post-quiz and answer and scoring sheets).

- To gauge the **reliability** of the tests, the tests should be administered twice at two different points in time. Prior to administering the tests to the students it was administered to a small group of students, similar to the population of the research study, with the aim of refining the test (see section 5.6). This step ensured test/re-test reliability, since the test is administered twice at two different points in time, namely before the actual administration of the tests and during the actual administration of the tests.

- Validity and reliability of questionnaires used in the follow-up interviews should also be ensured. A typical strategy for improving the validity and reliability of the research and evaluation of the findings is **triangulation**. Triangulation

strengthens the study by combining the use of multiple instruments of data collection and data analysis. For the purpose of this study, pre- and post-test and follow-up interviews were used as data collection instruments. The data were analysed, using both quantitative and qualitative data analysis (Cano, 2000:n.p. & Golafshani, 2003:604).

According to De Vos (2005:387), each type of program evaluation requires that a certain step should be implemented, namely the choosing of variables. The next section will discuss the variables.

5.8   Choosing the variables

The aim of choosing variables is to determine whether one specifically chosen variable – the independent variable – affects other variables, namely dependent variables. The dependent variable is the one that needs to be measured to determine how it was affected by the independent variable.

Powell and Connaway (2004:55) state that the dependent variable is a desired value, goal or effect and the independent variable is often a program. The independent variable (X) is therefore the DILP and the dependent variable *(Y)* is the desired outcome – digital information literacy skills. In order to measure the dependent variable, the test questions were set according to the specific outcomes as formulated in the DILP.

The dependent variables are set out in Table 5.4. The questions in the tests, addressing the specific dependent variable, are indicated in the last column.

Table 5.4: Dependent variables derived from the outcomes

Dependent variable no.	Outcomes of Unit 1 – The student can	Questions
1	understand the need to find and use digital information	1 and 2
2	define a topic	3
3	refine the topic	4
4	explore general digital information sources	5

Dependent variable no.	Outcomes of Unit 2 – The student can	Questions
5	select the most appropriate digital information sources for finding the required digital information	6
6	select the most appropriate digital information access tools for finding digital information	7, 8, 9 and 10
7	construct and carry out an effective digital search strategy	11 and 12

Dependent variable no.	Outcomes of Unit 3 – The student can	Questions
8	evaluate the quality of a digital information source using multiple criteria, including authority, currency, content and reviews	13
9	use the criteria	14, 15, 16 and 17

Dependent variable no.	Outcomes of Unit 4 -The student can	Questions
10	identify various digital information formats	18
11	create a system for organising the digital information	19
12	capture the digital information	20
13	take precautions to avoid the spreading of computer viruses	21
14	know what digital storytelling is	22

Dependent variable no.	Outcomes of Unit 5 - The student can	Questions
15	organise digital information	27
16	synthesise the digital information found	28

Dependent variable no.	Outcomes of Unit 6 - The student can	Questions
17	understand free versus fee-based access to digital information	23
18	understand copyright and plagiarism	24
19	use a citation and bibliographic reference style	25 and 26

Dependent variable no.	Outcomes of Unit 7 - The student can	Questions
20	maintain current awareness by keeping up to date with digital information sources and technologies	29
21	recognise social networking sites	30

The outcomes will therefore be the dependent variables that should be measured (using the pre- and post-test questions) to reflect the effects of the independent variable (the DILP).

5.9   Data collection

During the research process, the researcher must make a decision regarding the way in which the data will be collected. This involves the data collection instruments and the data collection process itself. The data collection instruments involved the design of the the pre- and post-test as well as the question sheet for the follow-up interviews – as discussed in section 5.5. The data collection process deals with administering the instruments to gather the research data and the procedures followed to extract the data from the completed pre- and post-tests for analysis and interpretation.

The data collection for this research was done in two parts. Firstly, the pre- and post-test were administered and, after the data was analysed, the questions with a significance level of less than 0.05 ($p<0.05$) were pinpointed and follow-up interviews were conducted with reference to each of these questions.

5.9.1 Administering the pre- and post-test

Three steps were involved in administering the pre- and post-test for this study. Firstly, a letter of request was written to the Campus Director and Heads of Department at the

Nelspruit Distance Campus of TUT, requesting their assistance in asking the students to participate in the research project. This was done after consent was given by the Research Ethics Committee (see Appendix I, TUT Research Ethics Committee letter of approval – April 2010). An information leaflet and informed consent form (see Appendix G, Information leaflet and informed consent form) were also sent by courier to the Heads of Department and were distributed to the students prior to the arrival of the researcher. The researcher arrived at the campus on the date agreed by the Management Committee of the campus.

Secondly, a designated laboratory with Internet access was assigned to the researcher and students willing to participate in the research project arrived at a time scheduled by the students themselves. The DILP was made available in CD-ROM format and also loaded onto the computers.

Thirdly, the pre-test, called the digital information literacy pre-quiz, was handed out to the students. After the students completed the pre-quiz, they had to work through the DILP and then complete the digital information literacy post-quiz. The following table gives an indication of the participation.

Table 5.5: Students' participation in the quantitative part of the research project

Sample (n=510)	Total number
Pre-quizzes completed	510
Post-quizzes completed	488

Once the pre- and post-quizzes were completed, it was necessary for the data to be extracted and collated in some form of analysis.

5.9.2 Data reduction and processing

The pre- and post-quizzes were marked using an answer key, and the results were entered onto a scoring sheet, whilst simultaneously examining the data for accuracy. Data accuracy was achieved by making sure that the responses were legible/readable and both the pre- and post quizzes were completed.

Table 5.6 gives an indication of the total number of quizzes marked, the quizzes rejected and respondents for follow-up questioning.

Table 5.6: Total number of pre-and post-quizzes marked and respondents for follow-up interviews

Sample (n=510)	Total number
Pre-quizzes rejected (ineligible)	3
Post-quizzes rejected (ineligible)	3
Pre-quizzes rejected	24
Post-quizzes rejected	2
Pre- and post-quizzes completed and marked	486
Respondents identified for follow-up questioning	453
Respondents contactable for follow-up questioning	149
Respondents for follow-up interviews	87

Three pre- and post-quizzes were rejected because the participants were not eligible to take part as they were older than 32. Twenty-four (24) pre-quizzes were rejected because the participants did not complete the post-quizzes and two post-quizzes were rejected because the students did not complete the pre-quizzes.

Although the study strove to draw the largest possible sample, non-responses did occur. Non-responses are due to these inter-related problems:

- Non-involvement of participants in the research, which supports the principle of

voluntary participation.

- Ineligibility to respond.

- Failure to supply all the necessary information (some participants did not complete both the quizzes).

A data entry template in Excel format was used to enter the demographic details of each student who participated in the research project, as well as the results from the scoring sheets. This was done for each question in the pre- and post-quiz. The following figure is an example of the Excel template used for the statistical analysis of the quiz items.

Figure 5.4: Data entry template for quantitative data

5.9.3 Analysis of the DILP test results

Specific methods for testing and analysing the results from the pre- and post-quiz were used to suit the requirements of this study. SPSS was used to extract data from the completed Excel data entry template.

Data analysis therefore involved the following:

- running descriptive analyses to get reports on data status (descriptive statistics).
- reaching conclusions extending beyond the immediate data (inferential statistics).

The above-mentioned will be discussed in detail in Chapter 6. The analysis of the data also assisted the researcher in identifying the questions in the pre- and post-quiz where two counts differed significantly and follow-up interviews were needed.

5.9.4 Telephonic and e-mail interviews – data collection

After the quantitative data was analysed, the questions which showed a decrease which was statistically significant (with a significance level of less than 0.05 ($p < 0.05$) were pinpointed and follow-up interviews were conducted concerning each of these questions. For each question, the filtering function in Excel was used to identify the students to whom the follow-up questions had to be e-mailed or, in cases where the e-mail address was not known, the students who had to be telephoned.

Of the 453 students identified, 249 students were contactable (available telephone numbers and e-mail addresses). Once again, the study strove to draw the largest possible sample (249), but non-responses did occur. Non-responses occurred due to respondents being located but unable to make contact or refusal to respond. Students' refusal to respond, however, supports the principle of voluntary participation. Eighty-seven (87) students responded to the questions in follow-up interviews.

According to the literature that provides some guidelines of the scale of qualitative investigation, this was adequate:

- Morse (1994:225) mentions 30-50 for interviews.
- Creswell (1998:64) suggests a range of 20-30.
- Bernard (2000:178) states that most studies are based on samples between 30 and 60 interviews.
- Ritchie, Lewis and Elam (2003:84) note that qualitative samples often "lie under 50".
- Wilmot (2005) indicates that one might expect to achieve between 20 and 50 interviews for a one-to-one investigation.
- Charmaz (2006:14) suggests that 25 participants are adequate for smaller projects.
- Green and Thorogood (2009:120) state that "the experience of most qualitative researchers is that in interview studies little that is "new" comes out of transcripts after you have interviewed 20 or so people".

A point of data saturation was also reached, where no new themes emerged from the data. Therefore, there was no need to contact the students with whom the interviewer initially did not make contact.

5.9.5 Analysis of the results from the follow-up interviews

The process of analysing the qualitative data obtained from the interviews started by sorting and arranging the data from the interview sheets into an Excel spreadsheet. For each of the identified questions a new work sheet was created and the words and phrases used by the students were entered into the work sheets (see Figure 5.5).

Figure 5.5: Data entry template for qualitative data
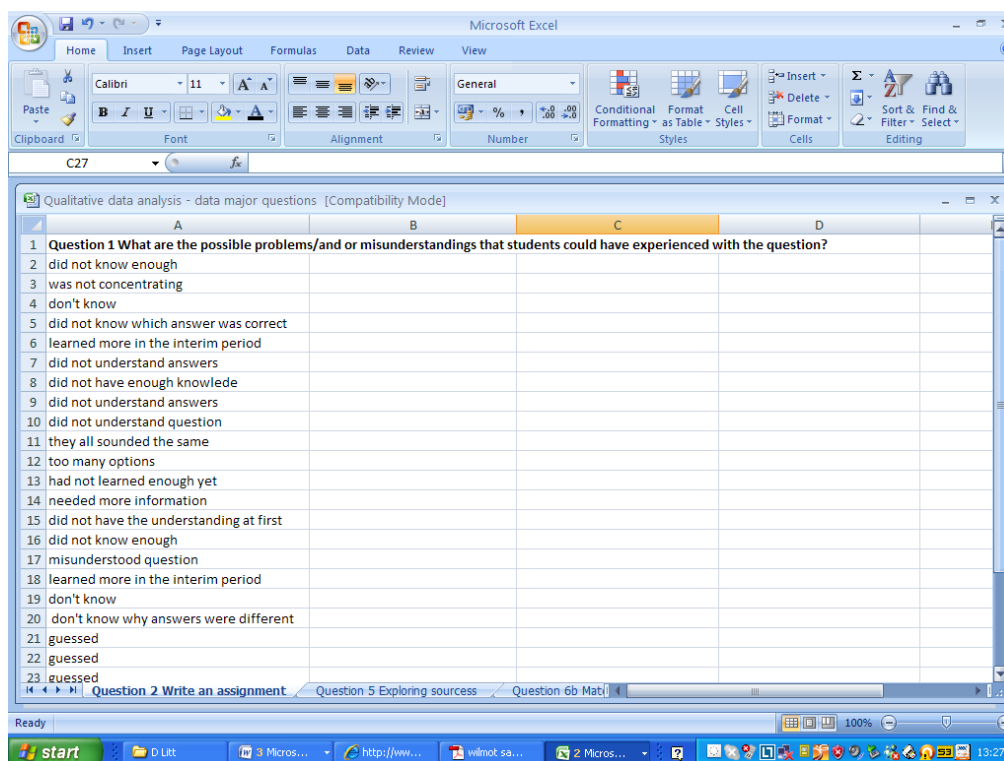
The researcher then attempted to get a general sense of the information, that is, what general ideas were expressed by the students? The detailed analysis began with a coding process. Using the coding, a small number of themes were identified. The themes were then converted into a quantitative format using SPSS, which was followed by the interpretation of the data. The data analysis is discussed in further detail in Chapter 6, along with the interpretation of the qualitative data.

5.10   Ethical considerations

The concept of ethics can be defined as

> A set of moral principles which is suggested by an individual or group, is subsequently widely accepted and which offers rules and behavioural expectations about the most correct conduct towards experimental subjects and respondents (Strydom, 2005a:57).

Ethical behaviour is important in research and even more so when the research involves human subjects. Since this research project involved human subjects, the following principles, invoked by the codes of research ethics, were applied. Firstly, that no harm should befall the research subjects and, secondly, that subjects should take part freely, based on informed consent (Welman, Kruger & Mitchell, 2005:181). The following principles were applied in order to protect the research participants:

- Voluntary participation
- Informed consent
- Protection from harm
- Confidentiality
- Anonymity.

The principle of **voluntary participation** requires that research participants should not be forced to participate in the research (Trochim, 2006b). To ensure that voluntary participation took place, the heads of departments and various lecturers at the Nelspruit Distance Campus of TUT invited all the students their departments to participate in the research by extending an invitation in class and distributing an information leaflet, (see Appendix G, Information leaflet and informed consent form). Students who then attended the sessions in the laboratory were, by default, there on a voluntary basis.

Concerning the interviews, the respondents who did not want to be involved after being telephoned or who did not respond to the questionnaires sent by e-mail were not contacted again. The students who answered the questions in the interview did so on a voluntary basis.

Informed consent means that prospective research participants must be fully informed about the procedures involved and they must give their consent to participate. To ensure that this principle was followed, the students each received an information leaflet and informed consent form to be completed (see Appendix G, Information leaflet and informed consent form). For the interviews, students were first asked whether they

agreed to the interview.

Ethical standards also require that researchers do not put participants in a situation where they might be at **risk of harm** as a result of their participation. Harm can be defined as both physical and psychological. The researcher explained in the information leaflet that the questionnaires and program to be worked through would not involve any foreseeable physical or psychological discomfort (see Appendix G, Information leaflet and informed consent form). Huysamen (1993:189) states that discomfort that may arise from being involved in a study is often minimal.

Confidentiality is guaranteed in almost all research. In this case, the information leaflet and the questionnaires contained information pertaining to confidentiality. A paragraph was added in the informed consent form stating, " … access to your data will be strictly limited to the researcher."

For the interviews, the interviewer also mentioned this after the student agreed to take part in the interview.

Anonymity means that the participant's identity or name will not be disclosed. A paragraph was added in the informed consent form stating the following: "… Also, your data and personal information will be kept and stored in a confidential format which will only be accessible to the researcher."

Once again, with the interviews, the interviewer also mentioned that the data and personal information would be kept and stored in a confidential format which would only be accessible to the researcher, after the student agreed to take part in the interview.

Furthermore, there needs to be a procedure that assures that the researcher will consider all relevant ethical issues. To address this, the Research Ethics Committee of TUT was approached. This Committee reviewed the research proposal, the research questionnaires (pre- and post-quiz), information leaflet and informed consent form. The Research Ethics Committee gave their approval (see Appendix I, TUT Research Ethics

Committee letter of approval – April 2010), thus ensuring the protection of both the organisation and the researcher against potential legal implications arising from failing to address important ethical issues of participants.

5.11   Summary

This chapter has outlined the empirical study conducted to evaluate the effectiveness of the DILP using a quasi-experimental research design. The combined quantitative and qualitative research approaches used as well as the research methodologies were also discussed.

Research instruments used were discussed by referring to the specific research instruments used for the purpose of this study, namely the pre- and post-test and telephonic and e-mail interviews. The design of the data collection instruments was discussed by focusing on

- test construction.
- test scoring and analysis.
- mapping the questions to the ACRL and CAUL standards and outcomes.
- testing the preliminary draft of pre- and post-test.

The data collection section in this chapter covered the administering of the pre- and post-test, the telephonic and e-mail interviews, and also mentioned data reduction, processing and analysis of the sample data. Other important aspects of research such as validity and reliability, the choosing of variables and ethical considerations were also addressed in this chapter.

All the above-mentioned forms the framework for achieving the aim of this study, as stated in Chapter 1, section 1.3.1 *Aim of the research*. In the following chapter, Chapter 6, the analysed data is presented and the findings interpreted.

Chapter 6

Data analysis and interpretation

6.1   Introduction

In Chapter 1, section 1.3.2, it is mentioned that the overall objective was to carry out an outcomes assessment using an outcomes assessment instrument to get a complete picture of the DILP's effectiveness in enhancing students' digital information literacy skills, therefore enabling one to judge the effectiveness and worth of the program.

For the purpose of this study, the students had to complete a pre-test, work through the DILP and then complete a post-test. The effectiveness of the DILP can therefore be determined by verifying if there was an improvement in the students' digital information literacy skills after working through the DILP. This chapter is concerned with the analysis and interpretation of the research data collected and extracted from the pre- and post-tests which were completed by 486 students, as well as data collected from telephonic and e-mail interviews (follow-up interviews), conducted with 87 students.

The statistical analysis is presented by using descriptive statistics (stacked bar charts for the quantitative data and pie charts for the qualitative data). Inferential statistics (the chi-square of McNemar and paired-samples t-test) were used to reach conclusions beyond the immediate data presented in the charts. The analyses and interpretation of the quantitative and qualitative data are discussed in more detail in the following sections.

6.2   Quantitative data analysis of the DILP testing results

The chi-square of McNemar and the paired-samples t-test were used, since both ensure correct and reliable statistical analysis of data in cases where a repeated measure

design is used. In this case, a pre- and post-test design was used and the data was collected from a single group.

The chi-square of McNemar detects statistically significant changes (as opposed to changes caused by chance) in the responses, which may be due to experimental intervention in "before-and-after" designs (did more students, for example, answer correctly after working through DILP?). The McNemar test will confirm whether results obtained can be attributed to the influence of the independent variable, the DILP. This data is also presented in contingency tables (see Appendix J, Contingency tables).

In the statistical analysis, a confidence level of 95% has been adopted, thus a p value of less than **0.05** ($p < 0.05)$ is considered to be statistically significant. The McNemar test was used for statistial analysis of the pre- and post-test questions as the data presented is nominal.

In cases where the decrease was statistically significant, the results of the qualitative data are presented as a means to make further inferences about the DILP and the outcomes assessment instrument.

The paired-samples t-test was used to gauge the overall impact of the DILP. The mean test score for the pre-test was compared to the mean test score for the post-test, to determine whether students obtained a better average score in the post-test than in the pre-test, after completing the DILP.

6.3   Qualitative data analysis of follow-up interviews

As mentioned in Chapter 5, section 5.9.5, the process of analysing the qualitative data proceeded by sorting and arranging the data from the interview sheets into an Excel spreadsheet. For each of the identified questions a new work sheet was created and the words and phrases used by the students were entered into the work sheets. The detailed analysis began with a coding process.

Coding involved dividing the text data into categories and labelling the categories with a term, in this instance, a term based on the actual language used by the students. In-Vivo Coding was used as a coding method. In Vivo Coding refers to a word or short phrase from the actual language found in the qualitative data record (Saldaña, 2009:74).

Where the same words, phrases or variations thereof were used by the students, such as *Don't know* or *Did not understand the question*, an In Vivo Code was applied. This was done by highlighting the codes in different colours; for example *Don't know* was highlighted in purple and *Did not understand question* was highlighted in blue. Each of the codes was highlighted using different colours. Some of the words or phrases were grouped together to fall under the same code, for example *Did not have the understanding at first* was also coded in blue for *Did not understand question*.

Figure 6.1: In Vivo Codes
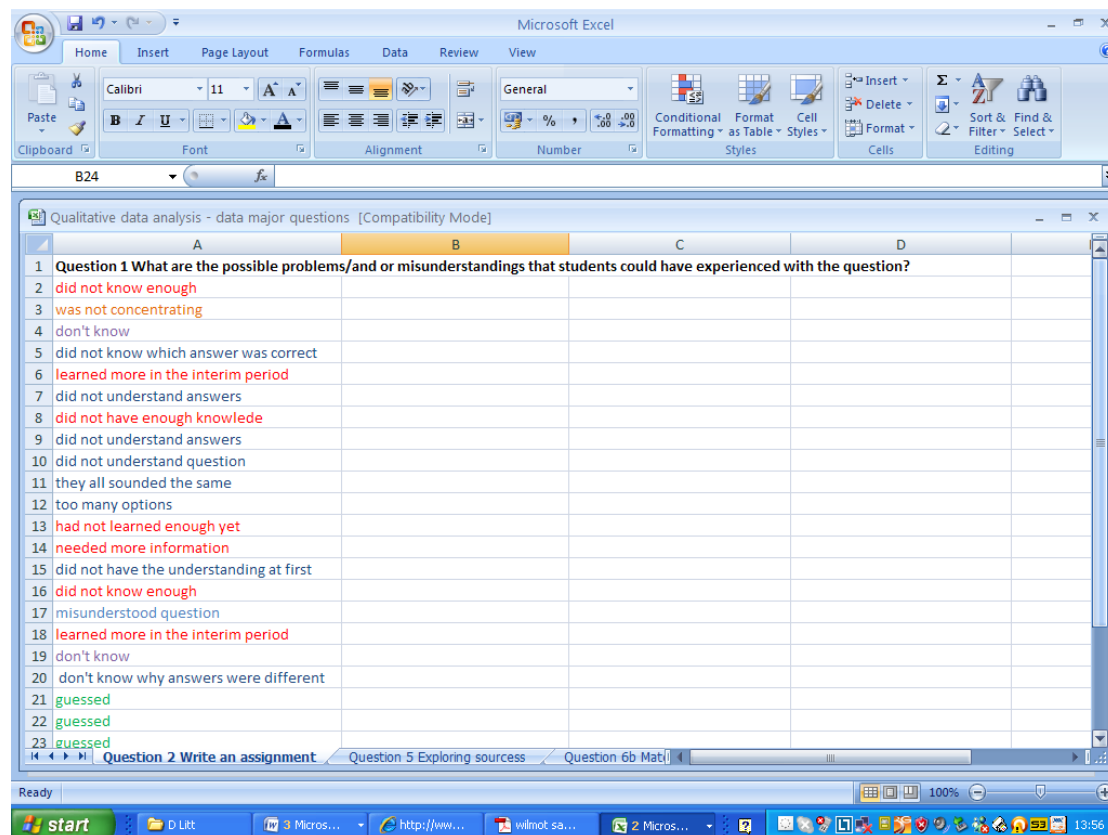
The coding was used to generate a number of themes, normally about five to seven themes for a research study. A theme is a phrase or sentence that identifies what a unit of data is about and brings meaning to a recurrent experience (Saldaña, 2009:139). Six themes were identified from the coding. The themes were identified for the question, *What are the possible problems and/or misunderstandings that students could have experienced with the question?* This question was asked for each of the nine identified questions where there was a statistical significant negative change in students' ability to answer the post-quiz question correctly.

In identifying the themes, the overall objectives of the study were kept in mind; for example the characteristics of the Generation Y and Z, the development of the outcomes assessment instrument and the program's effectiveness in enhancing the digital information literacy skills of the students. This was done in most of the cases, except where the responses could not be linked to the objectives, namely *Don't know* and *Guessed*. The themes are listed and explained:

- Attitudes

- Well-being

- Don't know

- Guessed

- Knowledge acquisition

- Did not understand the questions or options provided.

The remarks *Who cares* and *Not interested* were grouped under the theme, *Attitudes*. This can be linked to Generation Y's characteristic of boredom. They may have been bored and were therefore not interested in answering the question correctly. The interviewer, however, also experienced some difficulty in getting the whole-hearted co-operation of some of the respondents during the telephonic interviews.

For the *Well-being* theme, students' frame of mind was taken into consideration. Students mentioned, for example, that they were having a bad day or were simply not concentrating.

Students frequently indicated that they did not know which possible problems and/or misunderstandings students could have experienced with a specific question, therefore the theme *Don't know* was used to reflect this specific remark. As with *Don't know*, students also indicated frequently that they guessed the answer, thus the theme *Guessed*. These two themes cannot be linked directly to the objectives, but is still important as it appeared frequently and will therefore be interpreted.

The *Knowledge acquisition* theme links with the effectiveness of the DILP in enhancing the digital information literacy skills of the students. Common remarks made by the students during the follow-up interviews were that they have not yet learned enough to answer the question correctly or did not have enough knowledge to answer the question. As learning, or the process of acquiring a specific skill or knowledge, sometimes did not take place, the theme *Knowledge acquisition* was used.

The theme, *Did not understand the questions or options provided*, links with the development of the outcomes assessment instrument. This theme was derived from remarks such as *Did not understand the answers or questions*, *Question was confusing, Question was difficult* and *The answers were confusing*.

After the themes were identified, the In Vivo Codes were grouped into the themes, counted and presented in quantitative format using SPSS. In order to report the research findings, the most important statistical terms used in this chapter are defined in the following section.

6.4   Terminology

The important statistical terms are defined as they are understood and used in this study.

6.4.1   Decriptive statistics

According to Trochim (2006a), descriptive statistics are used to describe the data in a study, providing summaries about the sample and the measures.

6.4.2   Chi-square of McNemar

The chi-square of McNemar is used for detecting changes in responses due to experimental intervention in "before-and-after" designs, when the same individuals are measured twice (PASW Statistics, 2009 & Newsom, 2011).

6.4.3   Inferential statistics

Inferential statistics are used to reach conclusions that extend beyond the immediate data alone.   In this study, inferential statistics are used to make judgements of the probability that an observed difference is statistically significant (Trochim, 2006c).

6.4.4   Paired-samples t-test

The paired-samples t-test compares the means of two variables for a single group, to determine if the difference between the means is statistically significant (EZAnalyze, 2011?).   A two-tailed paired-samples t-test was used.   Two-tailed tests look for any difference between the two variables (pre-test means and post-test means), either in the positive or negative direction – ergo the two tails (SPSS, 2004:7 of 18).

6.4.5   Statistical significance

The statistical significance of a result is the probability that the observed relationship (for example between variables) or a difference (for example between means) in a sample occurred by pure chance. To use less technical terms, the statistical significance of a result tells one something about the degree to which the result is "true" (in the sense of being "representative of the population") (StatSoft, 2011).

6.5   Presentation of data and interpretation

In this section, the overall results for each question in the pre- and post-quiz will be presented and interpreted. The data and interpretation are presented in the following manner:

- Providing the pre- and post-quiz question.

- Supplying stacked bar charts for each question in the pre- and post-quiz to indicate the percentage of correct and incorrect answers.

- Explaining the statistics as depicted in the stacked bar charts.

- Indicating statistical significance where there was a positive change, followed by an interpretation of how the DILP could have had an influence.

- Indicating statistical significance where there was a negative change, followed by pie charts, representing the qualitative data from the follow-up interviews and also followed by an interpretation pertaining to the DILP and/or outcomes assessment instrument.

- Where changes were not statistically significant, no further inferences were made.

The following formula was used to calculate the percentage increase or decrease in pre- and post-test totals answered correctly:

(Number of students who answered correctly POST DILP *minus* Number of students

129

who answered correctly PRE DILP) *times* 100 *divided* by Number of students who answered correctly PRE DILP.

Figure 6.2: Formula to calculate percentage increase or decrease in pre- and post-test totals

> *n* who answered correctly POST DILP – *n* who answered correctly PRE DILP   x 100
> *n* who answered correctly PRE DILP

The following section will not only present the results of the quantitative and qualitative data analysis, but also provide an interpretation of the data using a systematic structure as listed above.

6.5.1 Data for and interpretation of Question 1 pre- and post-quiz

Question 1: We need information when we want to	
Pre-quiz	Post-quiz
a. Revise our diet b. Plan a holiday c. Write an assignment d. a, b and c	a. Revise our exercise routine b. Plan a long weekend c. Write an assignment d. a, b and c
The correct answer d. *a, b and c*	The correct answer is d. *a, b and c*

Figure 6.3: Percentage of correct and incorrect answers - Question 1
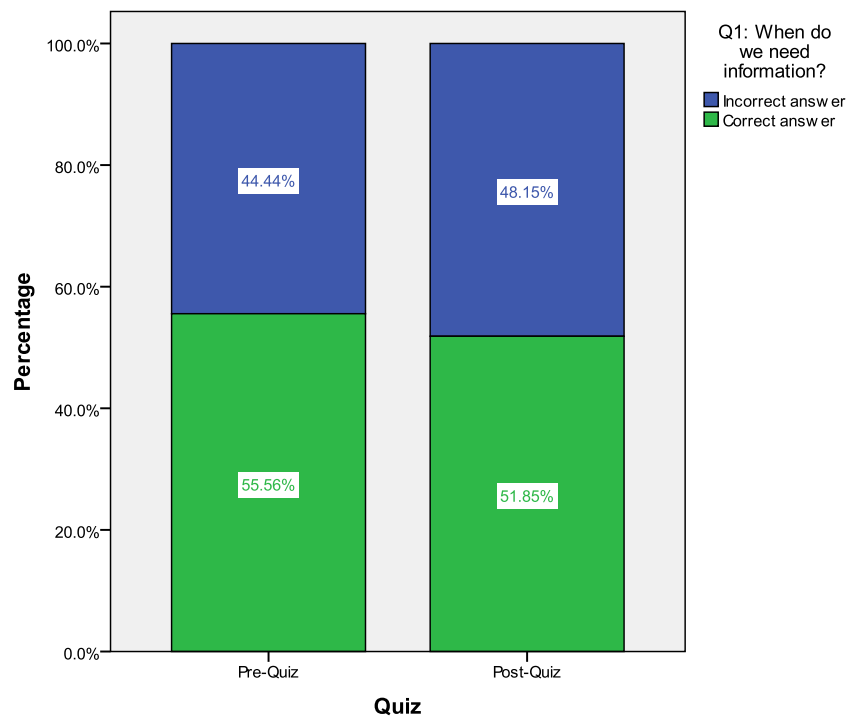
Results show that there was a seven percent (7%) decrease in students' understanding of when there is a need to find information, with 56% of the students (*n*=270) answering correctly in the pre-quiz and 52% of the students (*n*=252) answering correctly in the post-quiz, after working through the DILP.

The decrease is, however, not statisically significant (McNemar test, *p*= 0.089) and therefore no changes are suggested for improving the section, The need for information, in Unit 1 of the DILP. An adjustment to the outcomes assessment instrument, namely the pre- and post- quiz is also not considered.

6.5.2 Data for and interpretation of Question 2 pre- and post-quiz

Question 2: You have to write an assignment on a topic about which you know very little. What do you do to get started?	
Pre-quiz	Post-quiz
a. Browse the online catalogue of the library for books on your topic b. Search the Internet c. Find out some basics on your topic from an online reference source such as a digital encyclopaedia d. a, b and c	a. Search for the topic in the library's online catalogue b. Type the topic in a Web search engine such as Google c. Find some basics on your topic from a digital/online information source such as a subject specific encyclopaedia d. a, b an c
The correct answer is d. *a, b and c*	The correct answer is d. *a, b and c*

Figure 6.4: Percentage of correct and incorrect answers - Question 2
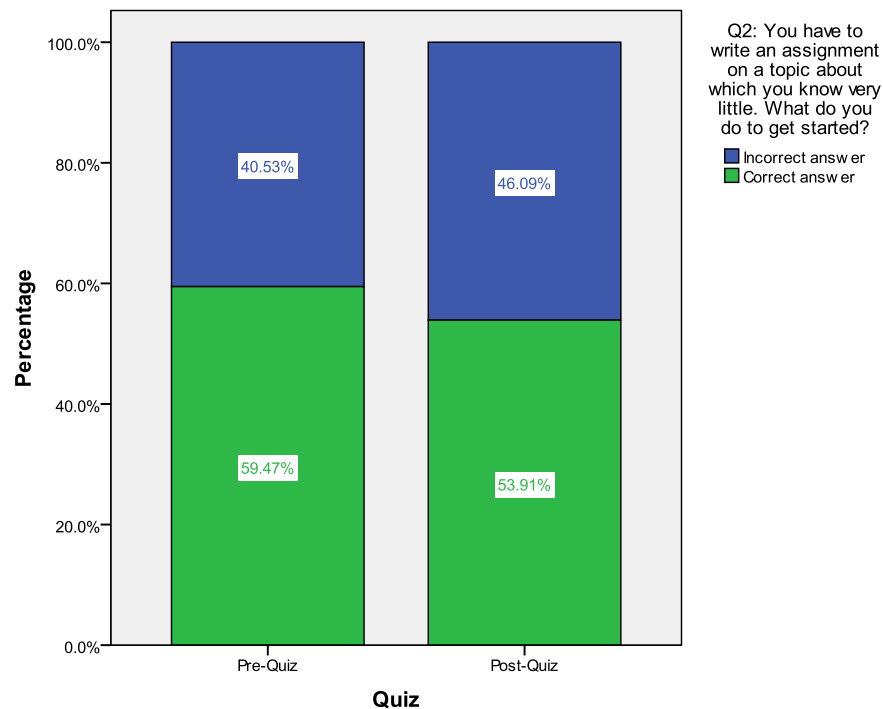
There was a nine percent (9%) decrease in the students' understanding that general information sources should be explored to increase familiarity with an assignment topic. In the pre-quiz, 59% of the students (*n*=289) answered correctly, whereas 54% of the students (*n*=262) answered the question correctly in the post-quiz (McNemar test, *p* = 0.019). Since this decrease is statistically significant, a follow-up telephonic interview pertaining to this question was conducted.

The question asked was, *What are the possible problems and/or misunderstandings that students could have experienced with the question*? The following pie chart displays the results of the qualitative data analysis.

Figure 6.5: Themes arising from student responses to Question 2
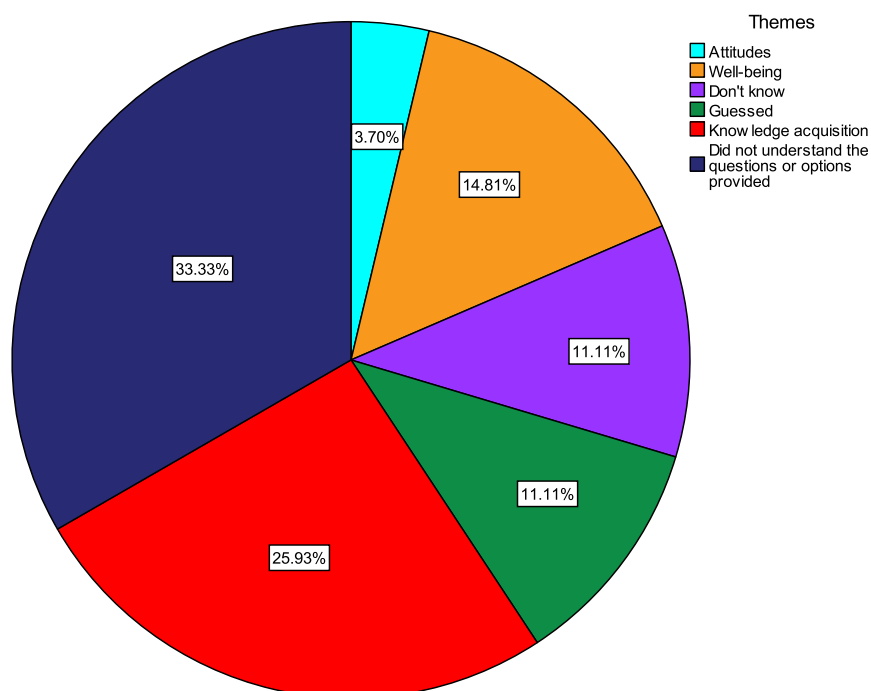
The interviews revealed that the biggest problem was that the students (33%) did not understand the question or multiple-choice options provided. Another problem was that the students (26%) felt that more learning was necessary. The DILP might have been more effective in enhancing this specific digital information literacy skill – understanding that general digital information sources should be explored to increase familiarity with an assignment topic – if students would be able to redo the specific section, Explore general digital information sources in Unit 1, and then re-answer the question.

The sources mentioned in the multiple-choices, namely an online catalogue, Web search engines and digital encyclopaedias, should also be included in the specific section of the DILP itself and not only the two general digital encyclopaedias, Encarta Encyclopaedia and Encyclopaedia Britannica, mentioned in this section of the DILP. This might improve the effectiveness of the DILP in enhancing the skill to understand that general digital information sources should be explored to increase an understanding of assignment topics.

The *Well-being* theme was also present here, with 15% of the students indicating that they were not concentrating. In revisiting the specific unit, students' concentration may

be improved and a re-attempt could be made to answer the question.

Eleven percent (11%) of the students mentioned that they had either guessed the answer or they did not know what problems students could have experienced with this specific question. Guessing, once again, could have been eliminated if students had revisited the section in the DILP and re-attempted to answer the question. The interviewer could have prompted for further explanations, but interviewers have less control over the interview situation in telephonic interviews.

With only four percent (4%) of students' responses falling into the *Attitude* theme, it was considered insignificant as the interviewer experienced some problems to get the co-operation of certain students over the telephone.

6.5.3 *Data for and interpretation of Question 3 pre- and post-quiz*

Question 3: Before searching for information on a topic, such as …	
Pre-quiz	Post-quiz
"violence in South African high schools", you should first	"the economic impact of the 2010 World Cup", you should first

a. Decide which Web sites are appropriate for the search
    b. Divide the topic into concepts or terms
    c. Know which aspects of the topic are most important
    d. b and c
	a. Decide which Web sites are appropriate for the search
	    b. Divide the topic into concepts or terms
	    c. Know which aspects of the topic are most important
	    d. b and c

The correct answer is d. *b and c.*	The correct answer is d. *b and c.*

Figure 6.6: Percentage of correct and incorrect answers - Question 3
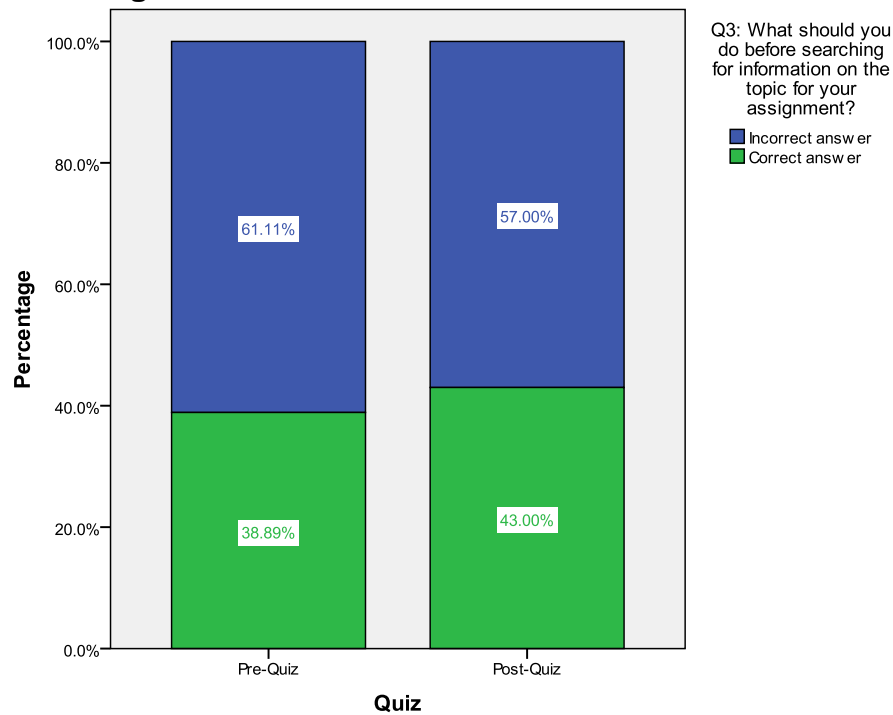
There was an 11% improvement in the students' skill to define a topic for an assignment. Forty-three percent (43%) of the students (*n*=209) answered the post-quiz correctly, as opposed to only 39% (*n*=189) who answered the pre-quiz correctly. The improvement is, however, not statistically significant (McNemar test, *p*=0.111), and the questions in the outcomes assessment instrument and the specific unit, Unit 1, Define your topic, in the DILP are therefore considered satisfactory.

6.5.4 Data for and interpretation of Question 4 pre- and post-quiz

Question 4: Which of these provide a narrower version of the following topic:	
Pre-quiz	Post-quiz
"violence in South African high schools"?	"the economic impact of the 2010 World Cup"?
a. Violence in high schools in the Western Cape b. Violence in schools in South Africa c. Destructive behaviour in high schools d. Don't know	a. Economic impact of the 2010 World Cup in Gauteng b. The economics of the last 2 years of the World Cup c. The economics of football in South Africa d. Don't know
The correct answer is a. *Violence in high schools in the Western Cape*	The correct answer is a. *Economic impact of the 2010 World Cup in Gauteng*

Figure 6.7: Percentage of correct and incorrect answers - Question 4

Q4: Which of these provide a narrower version of the following topic: _____?

■ Incorrect answer
■ Correct answer
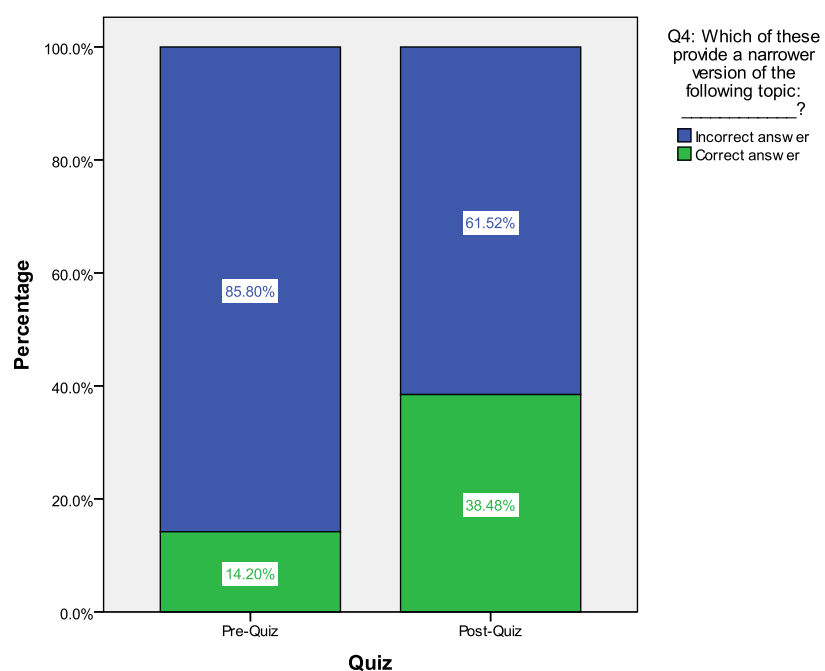
There was a considerable change in the students' ability to refine and limit a topic for an assignment. In the pre-quiz, only 14% of the students (n=69) answered correctly, as opposed to 38% (n=187) who answered correctly in the post-quiz. This constitutes a 171% improvement. This is statistically significant (McNemar test, p=0.000), meaning that it is unlikely that the improvement has occurred by chance and the improvement of this skill can be attributed to the DILP. It can therefore be concluded that the unit on limiting a topic is effective in enhancing the skill of refining and limiting topics for assignments.

These specific sections in the DILP used a character named Sipho, who asked the students to "help" him to refine and limit a topic for an assignment. This addresses the peer learning characteristic of Generation Y and therefore the DILP enhanced this digital information literacy skill. Using topics of interest to students is also important. In this instance, the soccer World Cup was used.

6.5.5 Data for and interpretation of Question 5 pre- and post-quiz

Question 5: The best way to find information for your assignment is to start by exploring general digital information sources such as	
Pre-quiz	Post-quiz
a. Wikipedia b. Encyclopedia.com c. Encyclopaedia Britannica d. a, b and c	a. Encyclopaedia Britannica b. UNIWIKI c. Encyclopedia.com d. a, b, and c
The correct answer is d. *a, b and c*	The correct answer is d. *a, b and c*

Figure 6.8: Percentage of correct and incorrect answers - Question 5
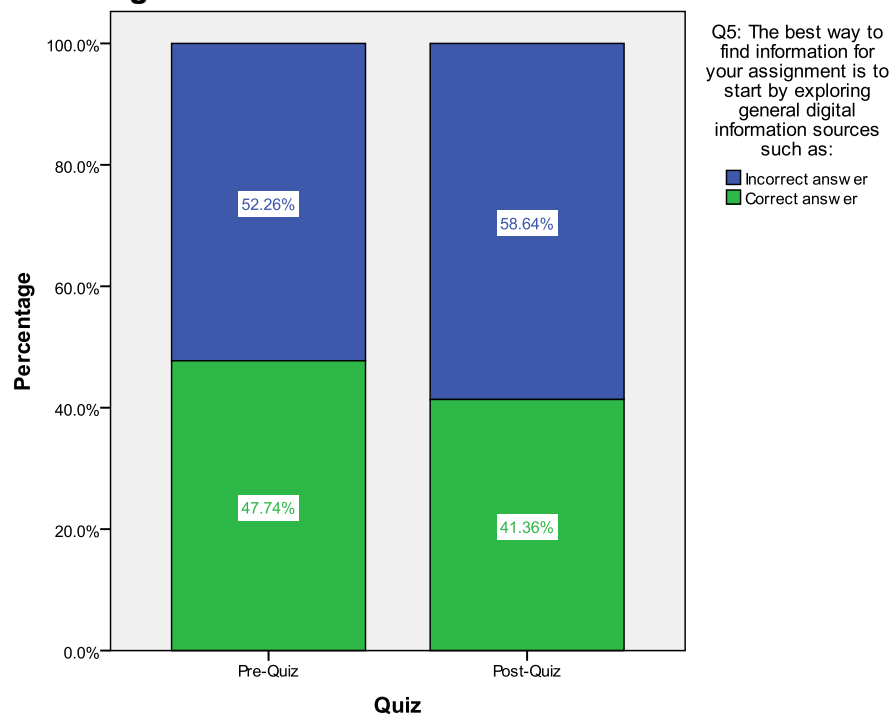
There was a significant decrease in the students' understanding that general digital information sources such as encyclopaedias can be explored to find information for assignments. In the pre-quiz, 48% of the students (n=232) gave the correct answer and 41% (n=201) answered correctly in the post-quiz (McNemar test, p = 0.016). Since this decrease is statistically significant, follow-up interviews were conducted.

The question asked was, *What are the possible problems and/or misunderstandings that students could have experienced with the question?* The follow-up interviews revealed that students (32%) did not understand the question or the multiple-choice options provided (see Figure 6.9).

One of the options in the post-quiz, namely UNIWIKI, was mentioned several times as not being understood. UNIWIKI should be included and explained in the section, Explore general digital information sources of Unit 1, together with the two general digital encyclopaedias currently explained in the section. Students are aware of Wikipedia, but not UNIWIKI. This may improve the effectiveness of the DILP in

enhancing the specific digital information literacy skill of exploring general digital information sources.

Figure 6.9: Themes arising from student responses to Question 5
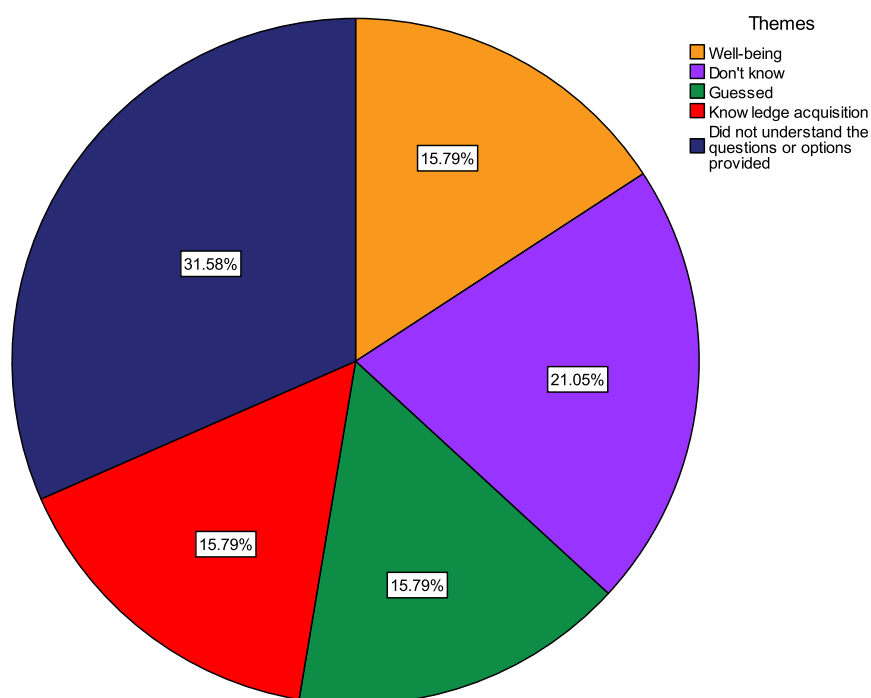
Twenty-one percent (21%) of the students replied that they did not know what possible problems and/or misunderstandings could have been experienced with Question 5. It can be inferred that this response reflects a lack of memory pertaining to Question 5, or it might have resulted from how the interviewer worded the question.

With 16% of responses falling into the *Well-being* theme, it can be inferred that students were not concentrating while answering the question. The fact that 16% of the students guessed the answer to the question and another 16% felt that they did not have enough knowledge to answer the question also indicated that students should be able to revisit the section in Unit 1 of the DILP, in an attempt to enhance their concentration and knowledge. An attempt to re-answer the question should then eliminate the guessing of answers.

6.5.6 *Data for and interpretation of Question 6a pre- and post-quiz*

Question 6a: For each information category on the left, circle the number of the best source to use to find the information:

Pre-quiz						Post-quiz					
Digital source→ Information ↓	Magazine (e.g. Drum)	Journal (e.g Journal of Medical Research)	Book (e.g. Anatomy of the Human Body)	Encyclopaedia (e.g. Wikipedia)	Don't know	Digital source→ Information↓	Magazine (e.g. Drum)	Journal (e.g Journal of Medical Research)	Book (e.g. Anatomy of the Human Body)	Encyclopaedia (e.g. Wikipedia)	Don't know
a. Current research on HIV/AIDS	1	2	3	4	5	a. Current research on TB (***Tuberculosis***)	1	2	3	4	5
The correct answer is 2. *Journal*						The correct answer is 2. *Journal*					

Figure 6.10: Percentage of correct and incorrect answers - Question 6a
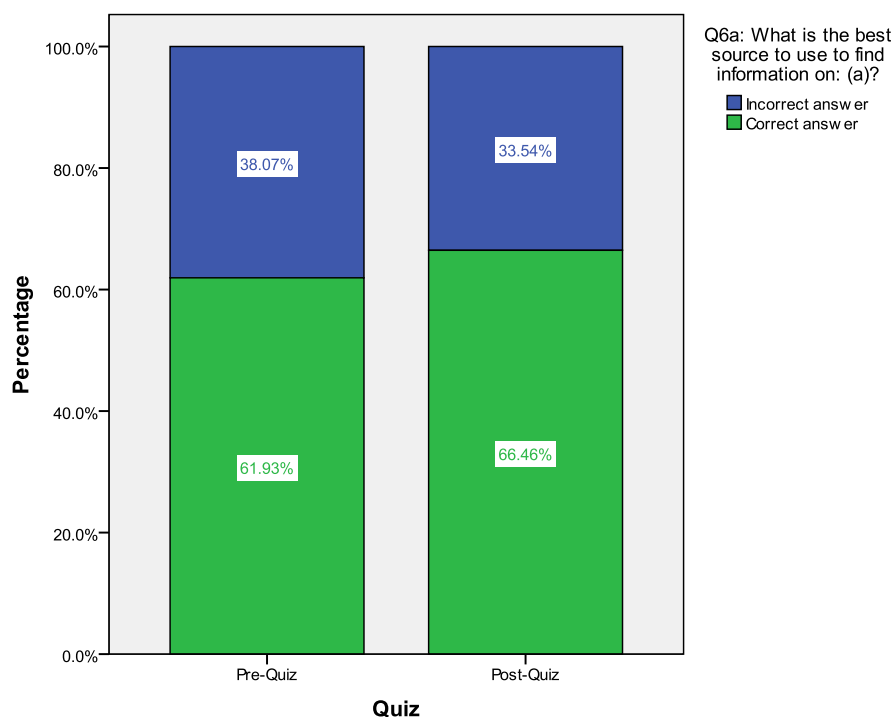
Sixty-two percent (62%) of the students (*n*=301) answered correctly before working through the DILP and 66% (*n*=323) answered correctly after completing the DILP, showing an increase of seven percent (7%). This indicates an improvement in the students' ability to understand that digital journals can be selected as an appropriate digital information source for finding current research. The McNemar test indicated a statistical signficance (*p*=0.047), in which case the change was unlikely to have occurred by chance and therefore the change may be attributed to the DILP, Unit 2, Digital journals.

This section, Selecting digital information sources, in the DILP uses graphics to explain the different types of digital information sources and supplies brief explanations of each. The journal example in the DILP and in the question is a medical journal, which could have assisted the students in answering the post-quiz question correctly and therefore enhanced this digital information literacy skill of students.

6.5.7 Data for and interpretation of Question 6b pre- and post-quiz

Question 6b: For each information category on the left, circle the number of the best source to use to find the information:											
Pre-quiz						Post-quiz					
Digital source→ Information ↓	Magazine (e.g. Drum)	Journal (e.g Journal of Medical Research)	Book (e.g. Anatomy of the Human Body)	Encyclopaedia (e.g. Wikipedia)	Don't know	Digital source→ Information↓	Magazine (e.g. Drum)	Journal (e.g Journal of Medical Research)	Book (e.g. Anatomy of the Human Body)	Encyclopaedia (e.g. Wikipedia)	Don't know
b. Fashion, diet tips and celebrity information	1	2	3	4	5	b. Exercise and lifestyle tips as well as TV programs	1	2	3	4	5
The correct answer is 1. *Magazine*						The correct answer is 1. *Magazine*					

Figure 6.11: Percentage of correct and incorrect answers - Question 6b
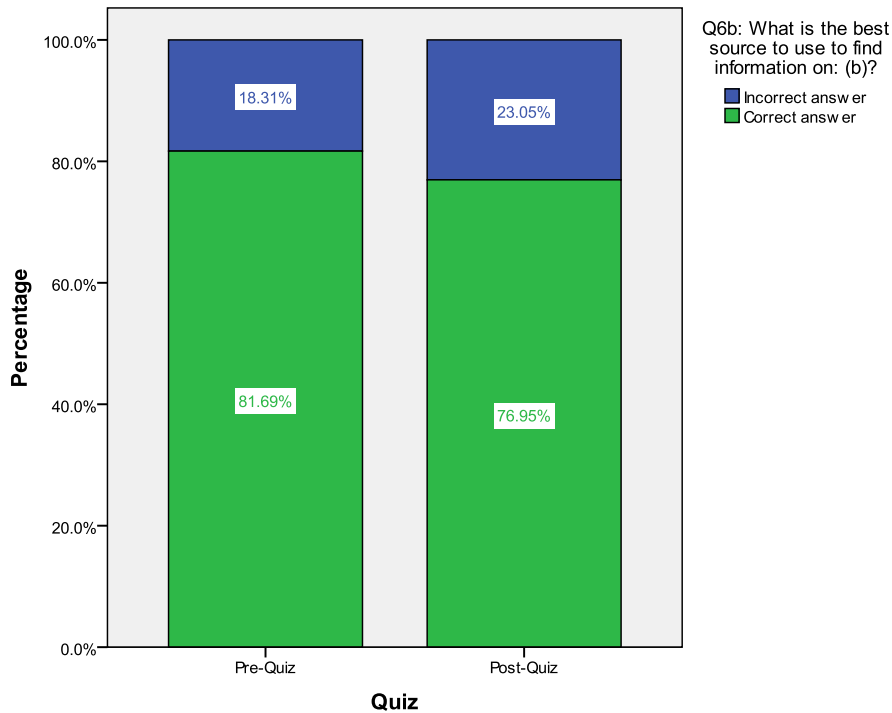
There was a significant decrease in the students' ability to select an appropriate digital information source for finding needed digital information. In the pre-quiz, 82% of the students (*n*=397) answered correctly and 77% (*n*=374) answered the question correctly in the post-quiz, showing a decrease of six percent (6%). This is statistically significant (McNemar test, *p*=0.016). Due to the statistical significance follow-up interviews were conducted.

The follow-up interviews revealed that the majority of students (86%) (see Figure 6.12:) responded that they found the question and options provided confusing. This was surprising, since the previous question was presented in the same format. The example used in the section, Magazines, of the DILP is, however, Finance Week and is most likely to be unfamiliar to students and should be changed to a more familiar magazine title such as Drum, which was used in the quizzes.

As mentioned in Chapter 5, section 5.5.1, the multiple-choice questions such as this one was constructed to include an "I don't know" option, as this discourages guessing.

This may not have been effective for this specific question, as 14% of students still guessed the answer to the question.

Figure 6.12: Themes arising from student responses to Question 6b
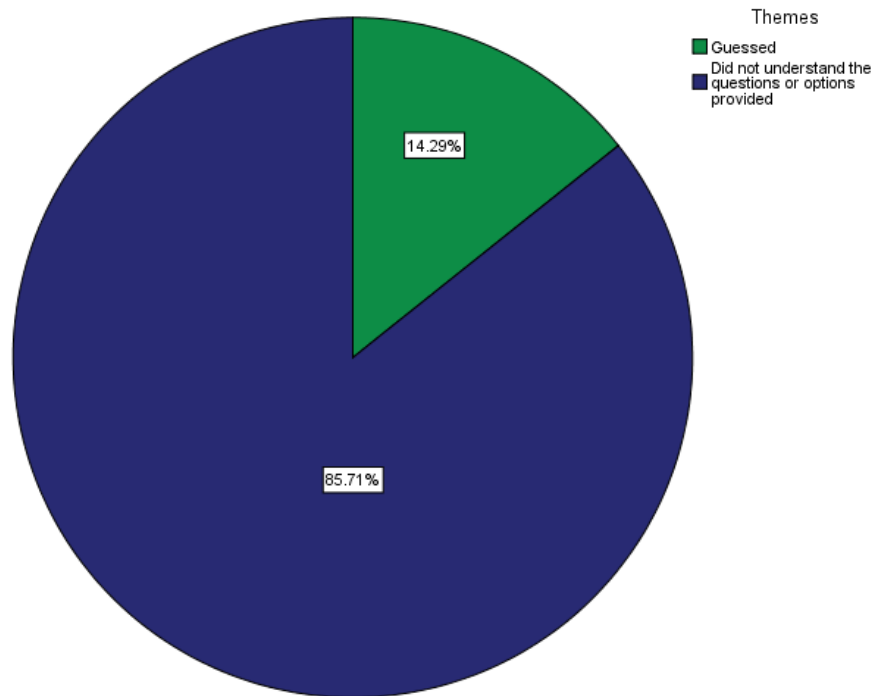
6.5.8 Data for and interpretation of Question 6c pre- and post-quiz

Question 6c: For each information category on the left, circle the number of the best source to use to find the information:

Pre-quiz						Post-quiz					
Digital source→ Information ↓	Mag azin e (e.g. Dru m)	Journal (e.g. Journal of Medical Resear ch)	Book (e.g. Anato my of the Huma n Body)	Encyclopa edia (e.g. Wikipedia)	Do n't kno w	Digital source→ Informatio n↓	Magaz ine (e.g. Drum)	Journal (e.g. Journal of Medica l Resear ch)	Book (e.g. Anato my of the Huma n Body)	Encyclopa edia (e.g. Wikipedia)	Do n't kno w
c. Description of the Ndebele culture	1	2	3	4	5	c. Descriptio n of the Tswana culture	1	2	3	4	5
The correct answer is 4. Encyclopaedia						The correct answer is 4. Encyclopaedia					

Figure 6.13: Percentage of correct and incorrect answers - Question 6c
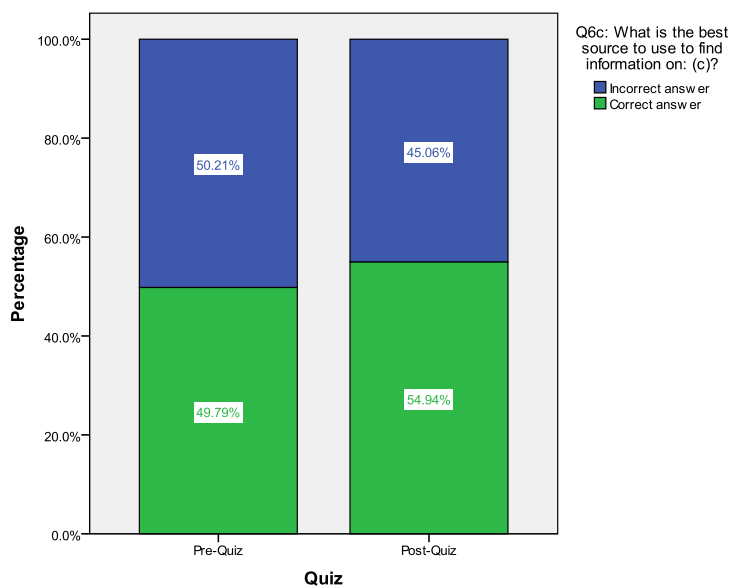
Fifty percent (50%) of the students (n=242) answered correctly, prior to working through the DILP, and 55% of the students (n=267) answered correctly after completing the DILP, showing an improvement of 10%. There was thus a significant change in the students' ability to select an appropriate digital information source for finding the needed digital information. The McNemar test indicated that this is statistically signficant (p=0.018), in which case the change was unlikely to have occurred by chance and can be attributed to the DILP.

The section in the DILP on Digital encyclopaedias (in Unit 2) refers to the Britannica Concise Encyclopedia which may be familiar to students. This section further explains that digital encyclopaedias should be used when looking for background information on a topic such as important persons, various cultures and countries. Using similar wording in outcomes assessment instruments and in the units of digital information literacy programs may enhance memorisation of information, as the information is repeated. This may help students in answering questions correctly, therefore demonstrating the effectiveness of the DILP in enhancing the specific digital information literacy skill.

6.5.9   Data for and interpretation of Question 6d pre- and post-quiz

Question 6d: For each information category on the left, circle the number of the best source to use to find the information:

Pre-quiz						Post-quiz					
Digital source→ Information↓	Magazine (e.g. Drum)	Journal (e.g. Journal of Medical Research)	Book (e.g. Anatomy of the Human Body)	Encyclopaedia (e.g. Wikipedia)	Don't know	Digital source→ Information↓	Magazine (e.g. Drum)	Journal (e.g. Journal of Medical Research)	Book (e.g. Anatomy of the Human Body)	Encyclopaedia (e.g. Wikipedia)	Don't know
d. Detailed information about the humerus (arm bone)	1	2	3	4	5	d. Detailed information about the femur (thigh bone)	1	2	3	4	5
The correct answer is 3. Book						The correct answer is 3. Book					

Figure 6.14: Percentage of correct and incorrect answers - Question 6d
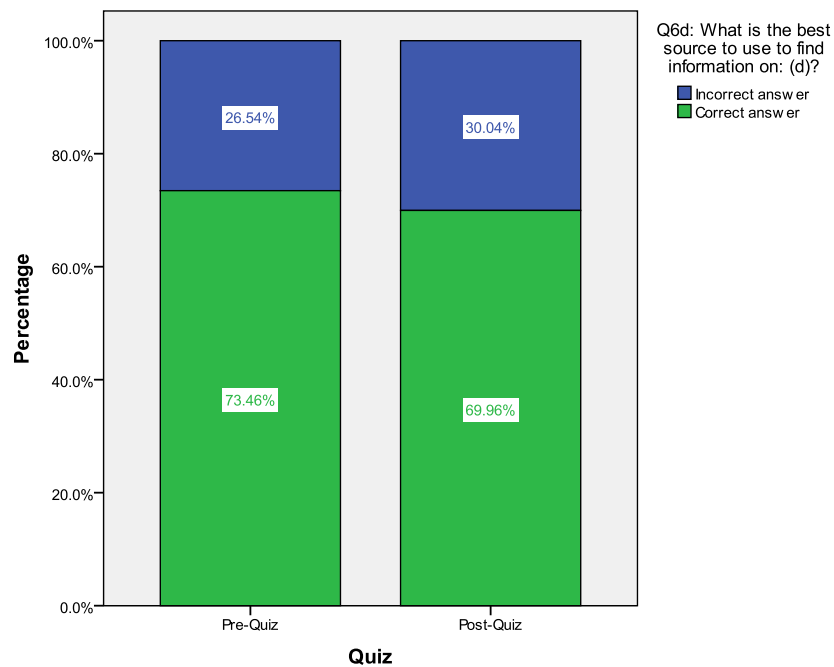
The results show that there was a five percent (5%) decrease in students' ability to select an appropriate digital information source for finding needed digital information (using a digital book) with 73% of the students (n=357) answering correctly in the pre-quiz and 70% of the students (n=340) answering correctly after working through the DILP.

The decrease is, however, not statistically significant (McNemar test, p= 0.078), and therefore this specific question in the outcomes assessment instrument and the specific unit in the DILP seems to be adequate.

6.5.10 Data for and interpretation of Question 7 pre- and post-quiz

Question 7: The World Wide Web (WWW) offers us various *tools* to access digital information. Which one would be best suited to find	
Pre-quiz	Post-quiz

the Web address for an institution?
 	
    a. Electronic database
    b. Search engine
    c. Hyperlink
    d. Don't know
 	
The correct answer is *b. Search engine*
	articles about "Generic drugs for treatment of brain cancer"?
	
	    a. Hyperlink
	    b. Search engines
	    c. Electronic databases
	    d. Don't know
	
	The correct answer is c. *Electronic databases*

Figure 6.15: Percentage of correct and incorrect answers - Question 7
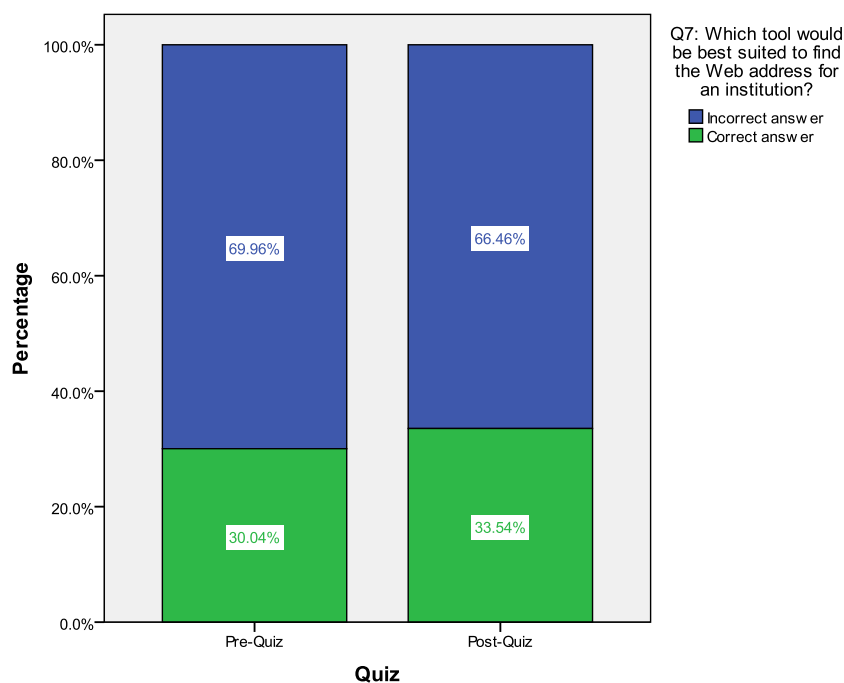
There was a 12% improvement in the students' ability to select the appropriate digital information access tool in order to find digital information. Thirty-four percent (34%) of the students (*n*=163) answered the post-quiz correctly, as opposed to the 30% (*n*=146) who answered the pre-quiz correctly. Although this is not statistically significant

(McNemar test, *p*=0.292), it does indicate that there was some degree of positive change and no adjustments are necessary for the outcomes assessment instrument and the DILP as such.

6.5.11 Data for and interpretation of Question 8 pre- and post-quiz

Pre-quiz	Post-quiz

Question 8: Some search engines organise pre-selected Web sites into subject areas and allow users to click through a menu to find information on their topic. Which one is the most appropriate to use when you are searching for universities in South Africa?
 	
    a.   Bing
    b.   Ananzi
    c.   Dogpile
    d.   None of the above
 	
 The correct answer is *b. Ananzi*
	Question 8: "Live" type of search engines indexes billions of Web pages, so that users can search for the information they desire, through the use of <u>keywords</u>. Which one is the most appropriate to use when you are searching for "Research methods"?
	
	    a. Metacrawler
	    b. Yahoo!
	    c. Google
	    d. None of the above
	
	 The correct answer is c. *Google*

Figure 6.16: Percentage of correct and incorrect answers - Question 8
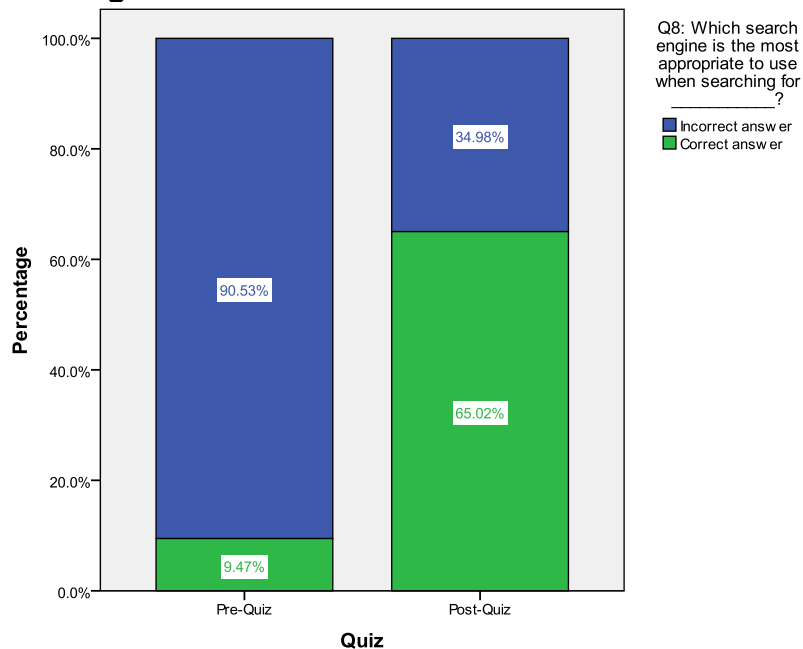
An overwhelming improvement of 587% is seen here for Question 8. In the pre-quiz, only nine percent (9%) of students (n=46) could select the most appropriate digital information access tool for finding digital information, whereas 65% (n=316) could select the appropriate "live" type of search engine in the post-quiz.

The statistical significance according to the McNemar test is p= 0.000, which excludes the probability that this may have occurred by chance and therefore the change can be ascribed to the DILP. The section, "Live" type of search engine, in Unit 2 of the DILP, provides a detailed description of such search engines, with specific reference to Google, and an interactive exercise where students have to search for a celebrity on Google.

The post-quiz also provided Google as an option and therefore 65% of the students answered this question correctly. Other "live" type of search engines can also be included in this section of the DILP and in the outcomes assessment instrument to further gauge students' understanding of the different "live" search engines.

6.5.12 Data for and interpretation of Question 9 pre- and post-quiz

Question 9: To search for information on … which digital information access tool would be the most appropriate choice?	
Pre-test	Post-test

"*Xenophobic* attacks *affecting refugees and asylum-seekers in* South Africa*"*
 	
    a. *Search engine*
    b. *Browser*
    c. *Full-text database*
    d. *Don't know*
	"*ANCYL (African National Congress Youth League) called for the nationalisation of mines in South Africa*",
	
	    a. *Search engine*
	    b. *Browser*
	    c. *Bibliographic database*
	    d. *Don't know*

The correct answer is a. *Search engine*	The correct answer is a. *Search engine*

Figure 6.17: Percentage of correct and incorrect answers - Question 9
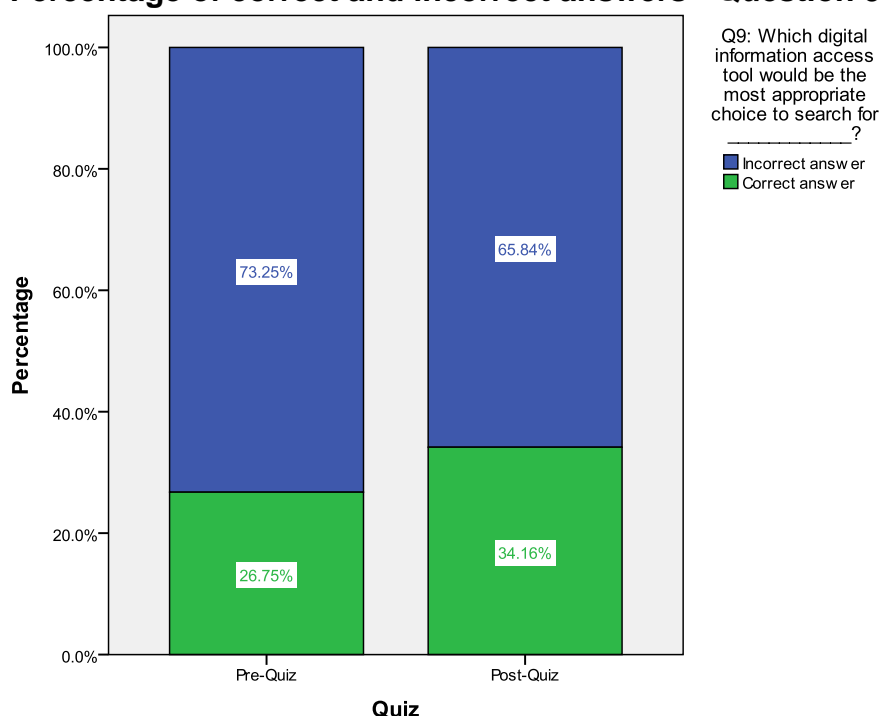
Thirty-four percent (34%) of the students (*n*=166) answered correctly after completing the DILP and 27% (*n*=130) answered correctly prior to working through the DILP, showing an improvement of 28%. There was thus a significant change in the students' ability to select a search engine as an appropriate digital information access tool for finding digital information, after completion of the DILP.

The McNemar test indicated that this is statistically significant (*p*=0.008), in which case the change was unlikely to have occurred by chance and therefore the change can be attributed to the DILP. The section in the DILP contains interactive exercises that are in line with various characteristics of Generation Y and Z, such as learning coupled with entertainment in the form of visual information and electronic multitasking, therefore making the section, Search engines, in Unit 2 effective in enhancing the specific digital information literacy skill.

An identified characteristic of Generation Y is the lack of critical thinking skills and an overlapping characteristic of Generation Z is the different information seeking behaviour, failing to evaluate information, however when guided on how to discern

among search engines the students did better.

6.5.13 Data for and interpretation of Question 10 pre- and post-quiz

Question 10: Digital information such as journal articles can be retrieved from databases. Which statement about databases is true?

Pre-quiz	Post-quiz
a. Databases allow you to search for full-text articles	a. Databases allow you to search for specific authors of journal articles
b. Databases allow you to search for bibliographic references to articles	b. Databases allow you to search for specific titles of journal articles
c. Full-text articles can be downloaded in .html or PDF formats	c. Full-text articles can be saved in .html or PDF formats
d. All the statements are true	d. All the statements are true
The correct answer is d. *All the statements are true*	The correct answer is d. *All the statements are true*

Figure 6.18: Percentage of correct and incorrect answers - Question 10
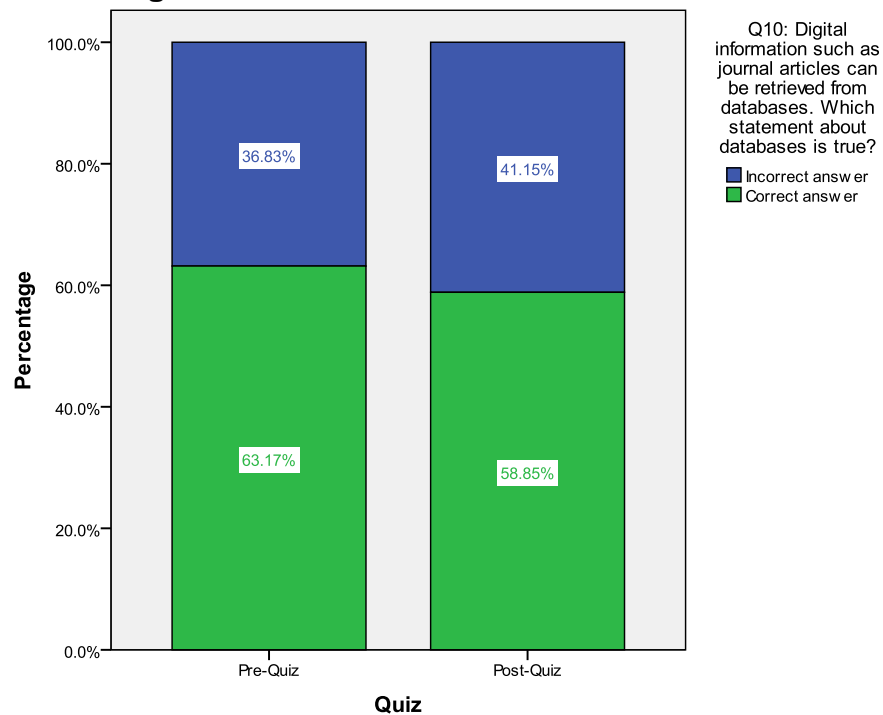
There was a decrease in students' ability to investigate the scope, content and organisation of information access tools such as databases. In the pre-quiz, 63% of the students (n=307) answered correctly and 59% (n=286) answered correctly in the post-quiz, showing a decrease of seven percent (7%).

This negative change is, however, not statistically significant (McNemar test, p= 0.110), in which case no changes are suggested for improving the section, Databases, in Unit 2 of the DILP. An adjustment to the outcomes assessment instrument, namely the pre- and post-quiz, is also not considered.

6.5.14 Data for and interpretation of Question 11 pre- and post-quiz

Question 11: Which of the following search strategies will get the best information when searching a database on the following topic?	
Pre-quiz	Post-quiz

"Discuss capital punishment as a deterrent to crime"
 	
    a. capital punishment OR crime
    b. deterrent AND crime AND capital punishment
    c. capital punishment AND crime
    d. punishment AND crime
	"Describe the characteristics of an asthma or hay fever attack"
	
	    a. asthma OR hay fever
	    b. (asthma OR hay fever) AND characteristics
	    c. asthma AND hay fever
	    d. characteristics AND attack

The correct answer is b. *deterrent AND crime AND capital punishment*	The correct answer is b. *(asthma OR hay fever) AND characteristics*

Figure 6.19: Percentage of correct and incorrect answers - Question 11
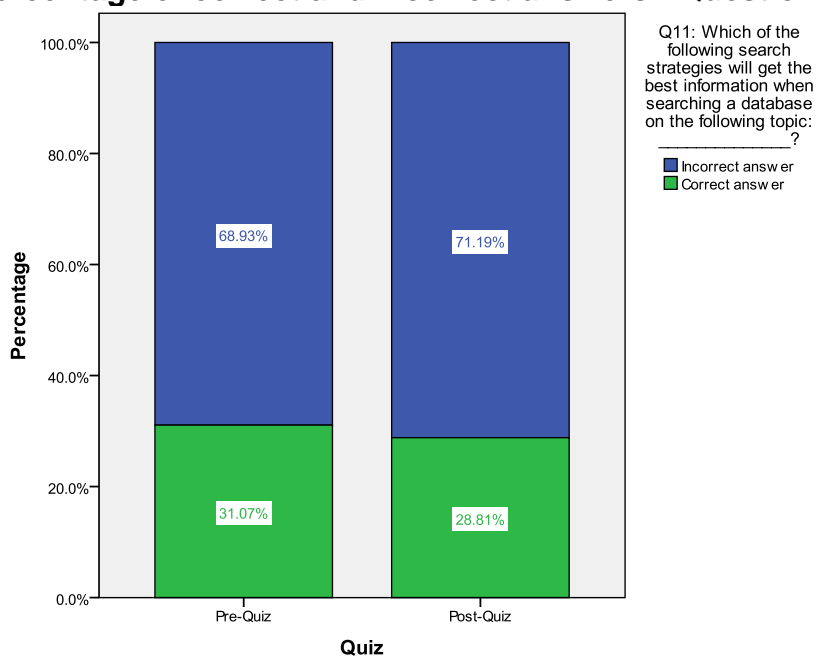
The results show that there was a seven percent (7%) decline in students' ability to construct a search strategy using Boolean operators, with 31% of the students (n=151) answering correctly in the pre-quiz and 29% (n=140) answering correctly after working through the DILP. The decline is, however, not statistically significant (McNemar test,

p=0.428) and therefore the questions in the outcomes assessment instrument and the specific unit, Boolean operators, in Unit 2, section: Constructing an effective digital search strategy, in the DILP, seem to be adequate.

Although students did not do too well in either the pre- or the post-quiz in indicating their ability to identify a well-constructed search strategy, the literature refers to their inability to search databases effectively. This is mainly due to the fact that they start off with Google searches and merely concentrate on the highest-ranked results on the first page – they seem unaware of databases. This is also linked to Generation Y and Z's characteristic of different information seeking behaviours. When enhancing students' digital information literacy skills, academic libraries should pay extra attention to the construction of effective digital search strategies, by using efficient units for these strategies in their digital information literacy programs.

6.5.15 Data for and interpretation of Question 12 pre- and post-quiz

Question 12: Phrase searching allows you to combine words so that you only get records where the words are *next to each other in the order specified*. Most databases and search engines use quotation marks (" ") to designate a phrase. Give an example of a phrase search that you might use in searching for information on the following topic:	
Pre-quiz	Post-quiz
Tourism management in South Africa	Adolescent drug use in high schools
The correct answer could be any one of the following "*tourism management*" or "*south africa*" or "*tourism management in south Africa*"	The correct answer could be any one of the following *"adolescent drug use" or "high schools" or "drug use" or "adolescent drug use in high school"*

Figure 6.20: Percentage of correct and incorrect answers - Question 12
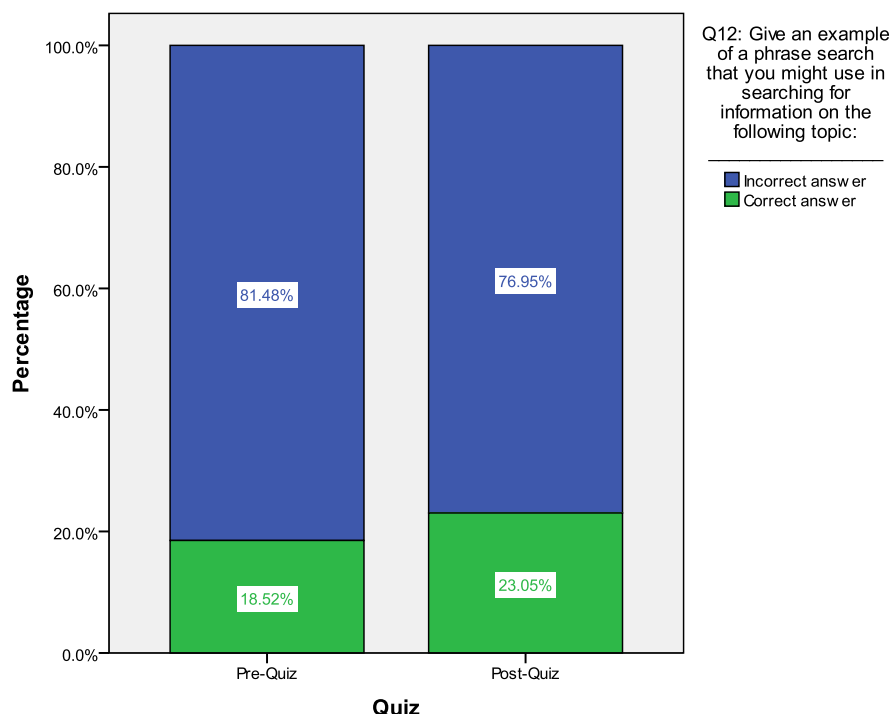
There was an increase of 24% in the students' ability to construct an effective search strategy using phrase searching. In the pre-quiz, 19% of the students (n=90) could do a phrase search, whereas 23% of the students (n=112) could do a phrase search in the post-quiz, after working through the DILP.

The statistical significance, according to the McNemar test, is p=0.019, which excludes the probability that this may have occurred by chance and therefore the change can be attributed to the DILP. The section on phrase searching in Unit 2 is then effective in enhancing the digital information literacy skill of constructing an effective phrase search.

This section may have triggered the students' memory of how to construct a phrase search, as an example in the unit of the DILP was *tourism management* and it was also used as an example in the pre-quiz.

It is also possible that the positive result can be related to Generations Y's lack of critical thinking skills and Generation Z's characteristic of different information seeking behaviour (generally they do not evaluate information), as it is likely that once they were guided in the DILP on how to construct a search question they did better.

6.5.16 Data for and interpretation of Question 13 pre- and post-quiz

Question 13: Which criteria should you use to evaluate whether or not a particular source is valuable for using in your assignment?	
Pre-quiz	Post-quiz
a. expert author, reliable information, up-to-date, objective b. famous author, high Internet search engine ranking, short, up-to-date c. famous author, up-to-date, easy to find, large quantity of information d. easy to read, Internet availability, visual aids (diagrams, photos) objective	a. Reputable author, trustworthy information, current, un-biased b. Well-known author, high Internet search engine ranking, concise, current c. Well-known author, current, not difficult to find, a lot of information d. Not difficult to read, accessible on the Internet, audiovisual aids (for example, video clips), un-biased
The correct answer is a. *expert author, reliable information, up-to-date, objective*	The correct answer is a. *reputable author, trustworthy information, current, un-biased*

Figure 6.21: Percentage of correct and incorrect answers - Question 13
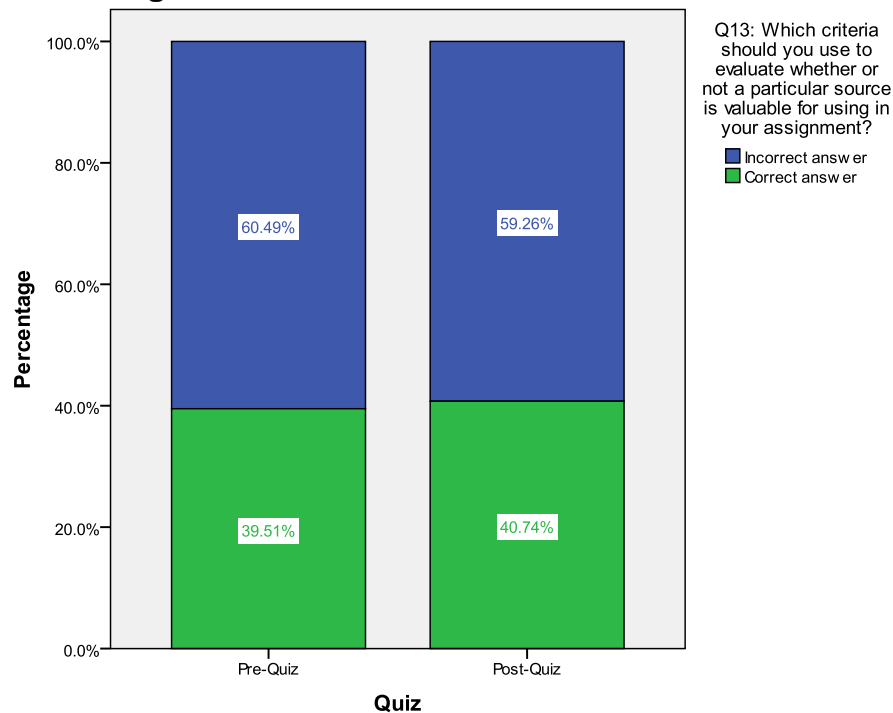
A three percent (3%) improvement is noticed in the students' ability to evaluate digital information sources using the authority criterion. Forty-one percent (41%) of the students (*n*=198) answered the post-quiz correctly, as opposed to the 40% (*n*=192) who answered the pre-quiz correctly.

This is, however, not statistically significant according to the McNemar test (*p*=0.689), even if there was some degree of positive change. No modification is therefore necessary for either the outcomes assessment instrument or the section, Criteria for evaluating digital information and its sources: Author, in Unit 3 of the DILP.

6.5.17 Data for and interpretation of Question 14 pre- and post-quiz

Question 14: When would you use an article located on the Internet for writing your assignment?	
Pre-quiz	Post-quiz
a. The article is written by an individual with a Ph.D. b. The article is available from a Web site ending in .edu c. The article is available, free-of-charge, from a directory such as Open Access Journals d. a, b and c	a. The article is written by a well-known scholar in the field b. The article is available from a Web site connected to a university c. The article is available, free-of-charge, from a directory such as Open Access Journals d. a, b and c
The correct answer is d. a, b an c	The correct answer is d. a, b an c

Figure 6.22: Percentage of correct and incorrect answers - Question 14

161
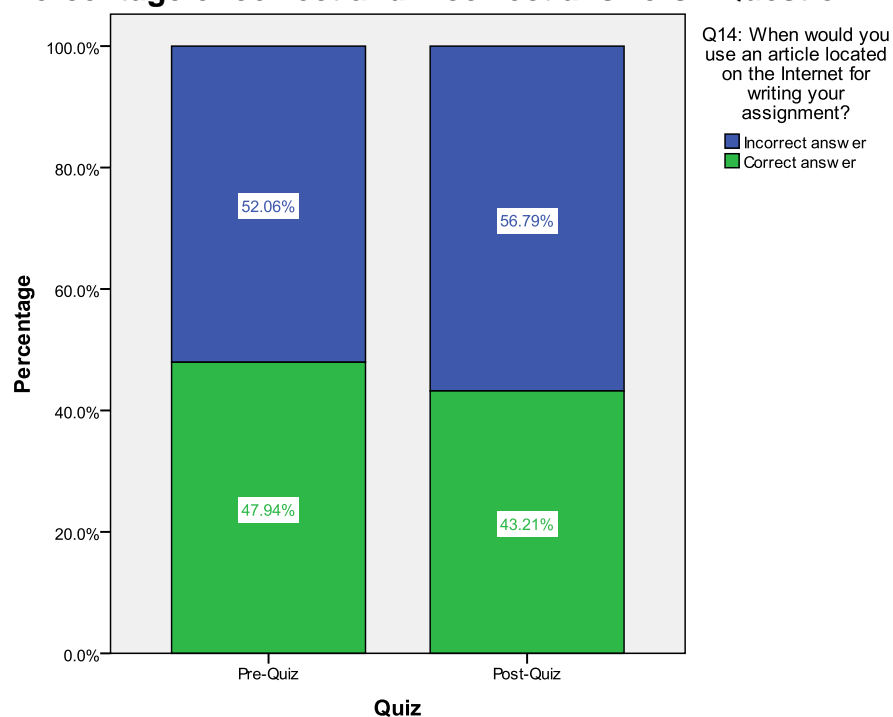
Results show that there was an 10% decline in the students' ability to apply the criterion, namely content, for evaluating digital information found on the Internet, with 43% of the students (n=210) answering correctly in the post-quiz and 48% (n=233) answering correctly in the pre-quiz.

The degree of negative change is, however, not statistically significant (McNemar test, p= 0.075). Consequently, no changes are suggested for improving the section, Criteria for evaluating digital information and its sources: Author, in Unit 3 of the DILP. An adjustment to the outcomes assessment instrument, namely the pre- and post-quiz, is also not considered.

6.5.18 Data for and interpretation of Question 15 pre- and post-quiz

Question 15: When evaluating sources of digital information, the date of the source is …	
Pre-quiz	Post-quiz

… only important in dealing with medical research
 	
    a. True
 	
    b. False
 	
    c. Don't know
	... important depending on the topic
	
	    a. True
	
	    b. False
	
	    c. Don't know

The correct answer is *b. False*	The correct answer is *a. True*

Figure 6.23: Percentage of correct and incorrect answers - Question 15
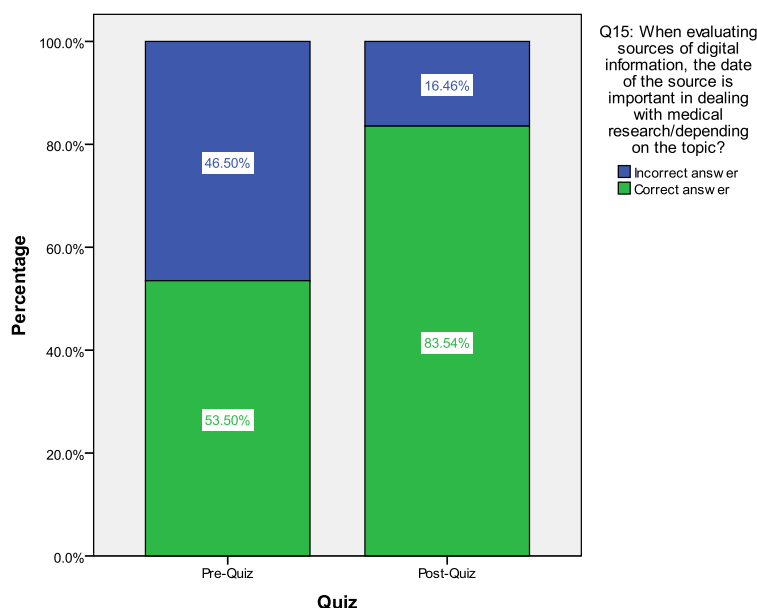
Eighty-four percent (84%) of the students (*n*=406) answered correctly after working through the DILP and 54% (*n*=260) answered correctly prior to completing the DILP, showing an improvement of 56%. There was therefore a signifcant change in the students' ability to evaluate digital information by using the date as a criterion.

The McNemar test indicated that this is statistically significant, (*p*=0.000) in which case the change can be attributed to the DILP. The section in Unit 3 of the DILP, Criteria for evaluating digital information, and more specifically using the date as criterion, is therefore effective in enhancing the digital information literacy skill of evaluating digital information sources, using date as a criterion. The section in the DILP explained the date criterion as follows:

> "Fields such as medicine or law might require more time-sensitive information than fields like history, but the date of the source is important depending on the topic."

The post-quiz question uses the same example, namely "depending on the topic" and could have triggered the students' memory, when they answered the post-quiz question. Repeating information may enhance memorisation which is an identified characteristic of Generation Y.

After being guided by the DILP in using date as a criterion to evaluate sources of digital information, the generations showed an improvement in answering the post-quiz question correctly, which means that the lack of critical thinking skills of Generation Y was addressed as well as Generation Z's inability to evaluate information.

6.5.19 Data for and interpretation of Question 16 pre- and post-quiz

Question 16: If you find a Web page, what would be your best clue as to whether the page is a reliable source to use in writing your assignment?	
Pre-quiz	Post-quiz
a. Finding out which institution is hosting the Web page b. Date of the last update of the page c. The quality of the page's graphic design d. a, b and c	a. The URL (e.g. http://www.tut.ac.za) b. The links the page has c. The layout, font and pictures used on the Web page d. a, b and c
The correct answer is d. *a, b and c*	The correct answer is d. *a, b and c*

Figure 6.24: Percentage of correct and incorrect answers - Question 16
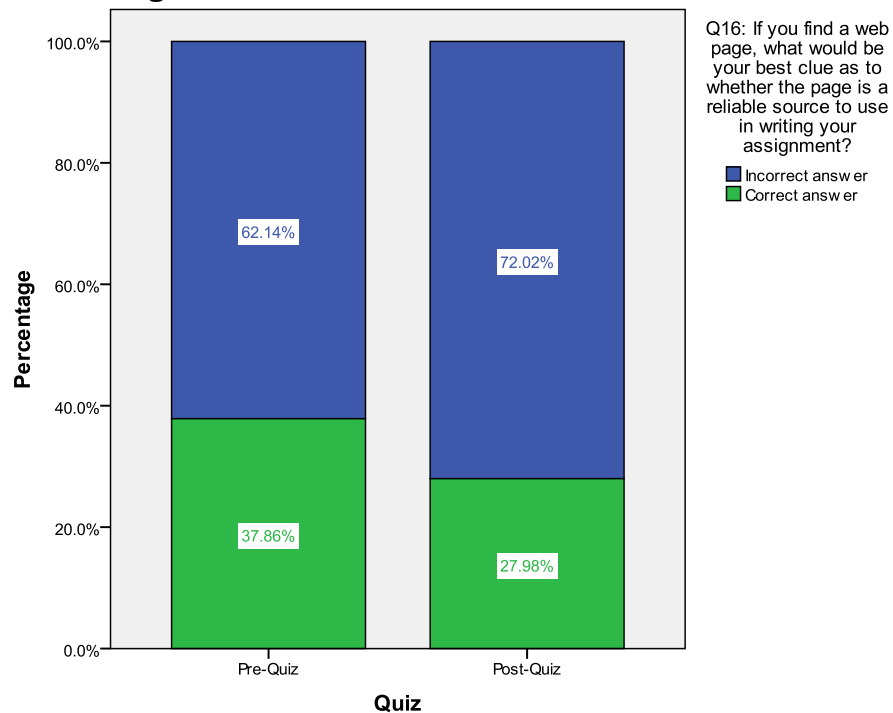
There was a significant decrease in the students' ability to evaluate Web sites using content as a criterion. In the pre-quiz, 38% of the students (*n*=184) answered this question correctly and 28% (*n*=136) answered it correcly in the post-quiz, showing a decline of 26%. This is statistically significant (McNemar test, *p*=0.000). Due to this statistical significance, follow-up interviews were conducted .

The question asked to the identified students was, *What are the possible problems and/or misunderstandings that students could have experienced with the question?* The follow-up interviews revealed that the majority of students (61%) did not understand the question or the multiple-choice options provided (see Figure 6.25).

Figure 6.25: Themes arising from student responses to Question 16
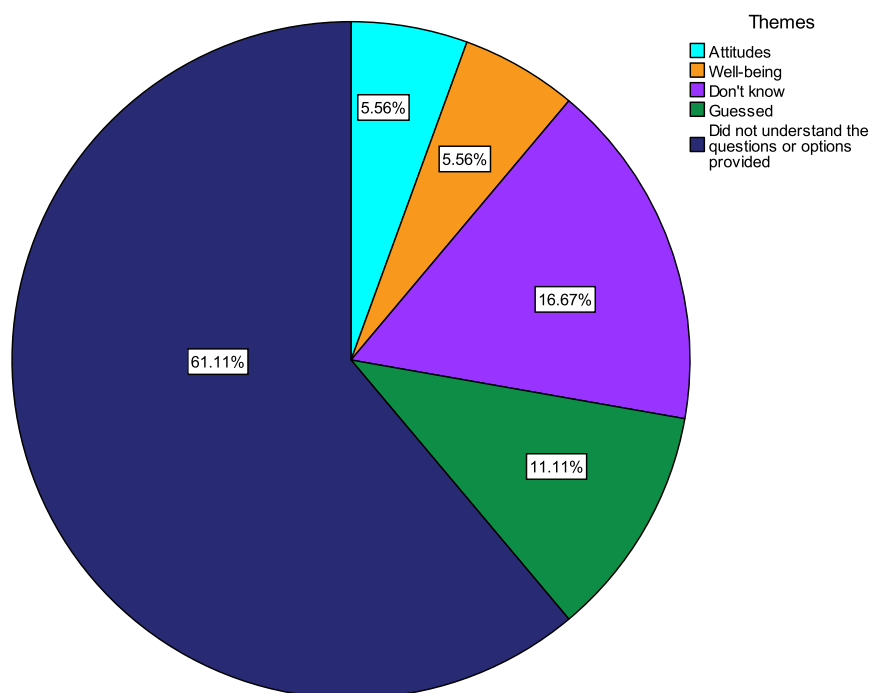
The reason why students might not have understood the question or the multiple-choice options provided, can perhaps be linked to the specific section, Content, as a criterion to evaluate digital information on Web sites, in Unit 3 of the DILP. The unit may not elaborate enough on the importance of content evaluation and does not, for instance, discuss how reliable Web sites can be identified by looking at the URL in order to determine the type of site and location. The program only mentions that information should be from reliable Web sites such as university pages and that the source should be judged in terms of popular or scholarly information.

This section in the DILP can perhaps also explain in more detail the quality of the pages in terms of the links, layout, fonts and graphics of the Web page and should not only mention that the information should be error-free, unbiased and trustworthy.

Another reason why the students may not have understood the question or the options provided, can be linked to Generation Y's lack of critical thinking skills and Generation Z's information seeking behaviour, which was mentioned as characteristics in Chapter 2, sections 2.3 and 2.4.6.

Students normally only concentrate on the highest-ranked results on the first page supplied by a search engine, without even scrolling or looking at the content. This shows their inability to sometimes evaluate results and it also shows that they view the first ranked results as being equal and worthy. It is therefore suggested that programs such as the DILP pay special attention to the evaluation of Web sites using content as a criterion.

Seventeen percent (17%) of the students responded that they did not know what possible problems and or misunderstandings students could have experienced with Question 16. It can be inferred that this response reflects a lack of memory pertaining to Question 16 or it might have resulted from how the interviewer worded the question.

In Chapter 5, section 5.5.1, it was mentioned that multiple-choice questions had four possible responses as this reduces the probability of a correct guess to 25% and, although multiple-choice questions are less susceptible to guessing than true and false test-items, 11% of the students still guessed the answer to the question. Guessing can, however, not be completely eliminated.

Six percent (6%) of the students indicated that they were either not concentrating or not interested in answering the question. Once again, it may be useful to encourage the students to revisit the section on Content in Unit 3 and re-answer the question.

6.5.20 Data for and interpretation of Question 17 pre- and post-quiz

Question 17: Which of the following is the best way to determine if the content of a Web page is accurate?	
Pre-quiz	Post-quiz
a. check the information against information from sources that rate sites b. ask a friend c. e-mail the author of the Web page d. assume the information is incorrect	a. Make sure author provides e-mail or a contact address/phone number. b. Know the distinction between author and webmaster c. Make sure the information is error-free d. a, b and c
The correct answer is a. *check the information … sites.*	The correct answer is d. *a, b and c*

Figure 6.26: Percentage of correct and incorrect answers - Question 17
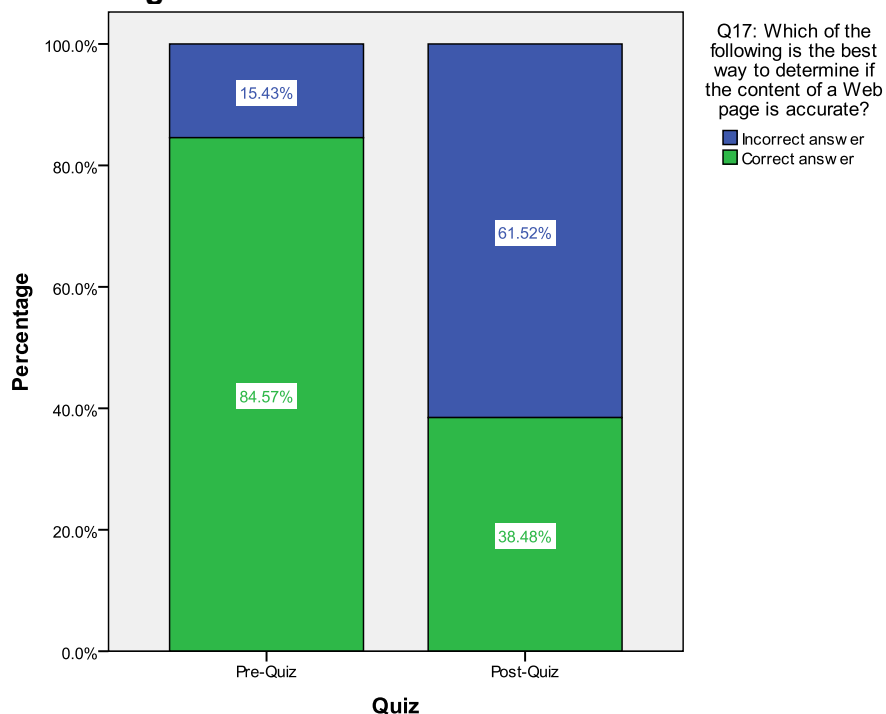
Again, there was a significant decrease of 55% in the students' ability to evaluate Web pages for accuracy using content as a criterion. In the pre-quiz, 85% of the students (*n*=411) gave the correct answer, as opposed to 38% of the students (*n*=187) who gave the correct answer in the post-quiz. According to the McNemar test (*p* = 0.000), this is

statistically significant and follow-up interviews referring to this question were conducted.

The identified students were asked what the possible problems and/or misunderstandings were that students could have experienced with the question? The follow-up interviews showed that 48% of the students did not understand the questions or the multiple-choice options provided (see Figure 6.27).

Figure 6.27: Themes arising from student responses to Question 17
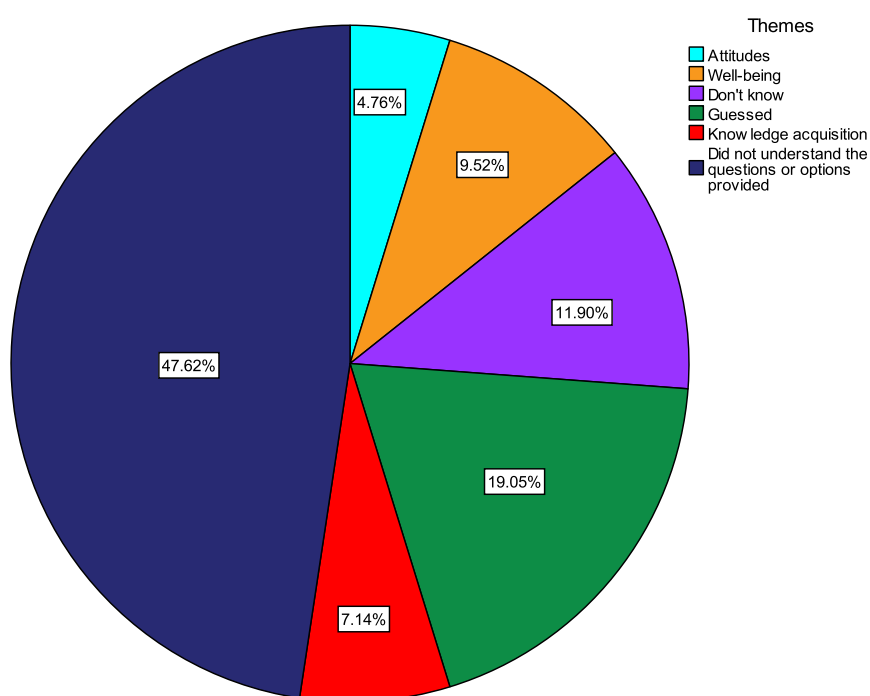
Once again, this may be linked to the section on content in Unit 3 of the DILP. Options a and b in the post-quiz – *make sure author provides e-mail or a contact address/phone number* and *know the distinction between author and webmaster* – were not discussed in this section of the DILP. It may therefore be useful to add this information to the section to enhance the effectiveness of the DILP in assisting students to apply the specific criterion to evaluate Web pages.

During the construction of the pre- and post-quiz, it was decided to provide four possible responses for selected-response questions such as the multiple-choice questions, as

this reduces the probability of a correct guess to 25%, but 19% percent of the students mentioned that they guessed the answer. Once again, guessing can not be entirely eliminated.

The 12% of students who responded that they did not know what possible problems and/or misunderstandings students could have experienced with Question 17, may have done so because they have a lack of memory pertaining to Question 17 in the post-quiz. Ten percent (10%) of the students indicated that they were not concentrating, which may have been a result of maturation. This is a treatment effect that is caused by natural biological challenges such as fatigue or hunger. Five percent (5%) of the students responded that they were not interested in answering Question 17 and this could also be caused by maturation.

It is important to note that the literature on information literacy and this research have shown that students sometimes have difficulty in evaluating Web sources and their information. This can be linked to the lack of critical thinking skills of Generation Y and the different information seeking behaviours of Generation Z. The importance of a detailed and interesting section on using content as a criterion to evaluate Web pages, in programs such as the DILP, cannot be emphasised enough.

In retrospect, Question 16 and 17 also seem to duplicate the testing of students' skills in evaluating the content of Web pages and can be merged or only one of the questions could be included if the outcomes assessment instrument is considered for future use.

6.5.21 Data for and interpretation of Question 18a pre- and post-quiz

Question 18a: For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension.			
Pre-quiz		Post-quiz	
a.___.jpg	1. Music/Audio	a.___.gif	1. Music/Audio
b.___.wav	2. Movie	b.___.MP3	2. Movie
c.___.avi	3. Image	c.___.MPEG	3. Graphic
d.___.gif	4. Graphic	d.___.jpg	4. Image
The correct answer is 3. *Image*		The correct answer is 3. *Graphic*	

Figure 6.28: Percentage of correct and incorrect answers - Question 18a
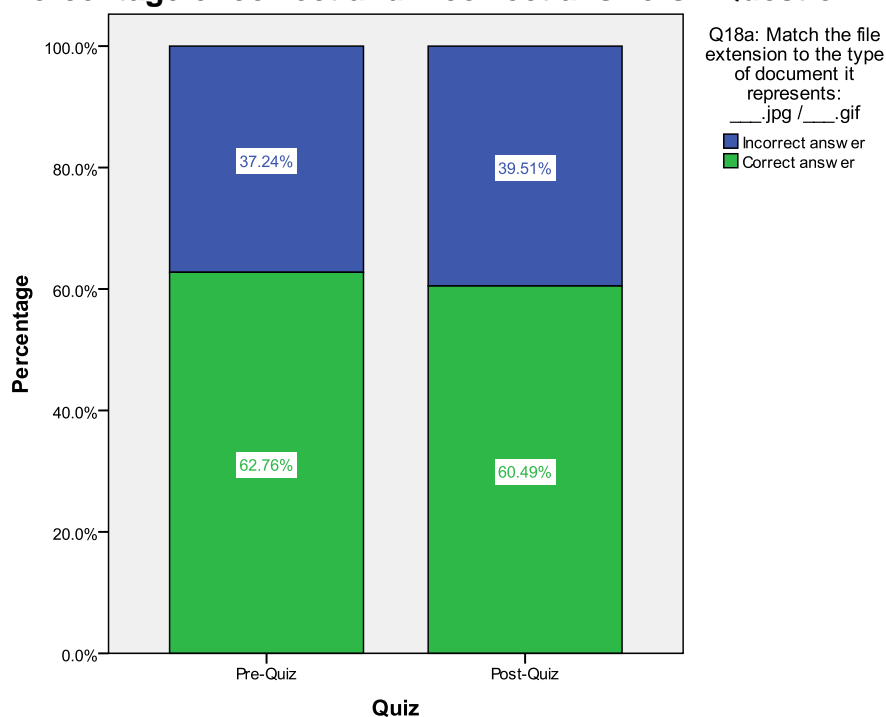
Sixty percent (60%) of the students (*n*=294) answered correctly after working through the DILP and 63% of the students (*n*=305) answered correctly prior to completing the DILP, showing a decrease of four percent (4%). There was a slight change in the students' ability to identify a graphic as a digital information format. This is, however, not statistically significant (McNemar test, *p*= 0.457) and therefore there is no treatment effect.

As a result, no changes are suggested for improving the section, Images, in Unit 4, Identifying digital information formats, of the DILP. An adjustment to the outcomes assessment instrument, namely the pre- and post-quiz, is also not considered.

6.5.22 Data for and interpretation of Question 18b pre- and post-quiz

Question 18b: For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension.			
Pre-quiz		Post-quiz	
a.___.jpg	1. Music/Audio	a.___.gif	1. Music/Audio
b.___.wav	2. Movie	b.___.MP3	2. Movie
c.___.avi	3. Image	c.___.MPEG	3. Graphic
d.___.gif	4. Graphic	d.___.jpg	4. Image
The correct answer is 1. *Music/Audio*		The correct answer is 1. *Music/Audio*	

Figure 6.29: Percentage of correct and incorrect answers - Question 18b
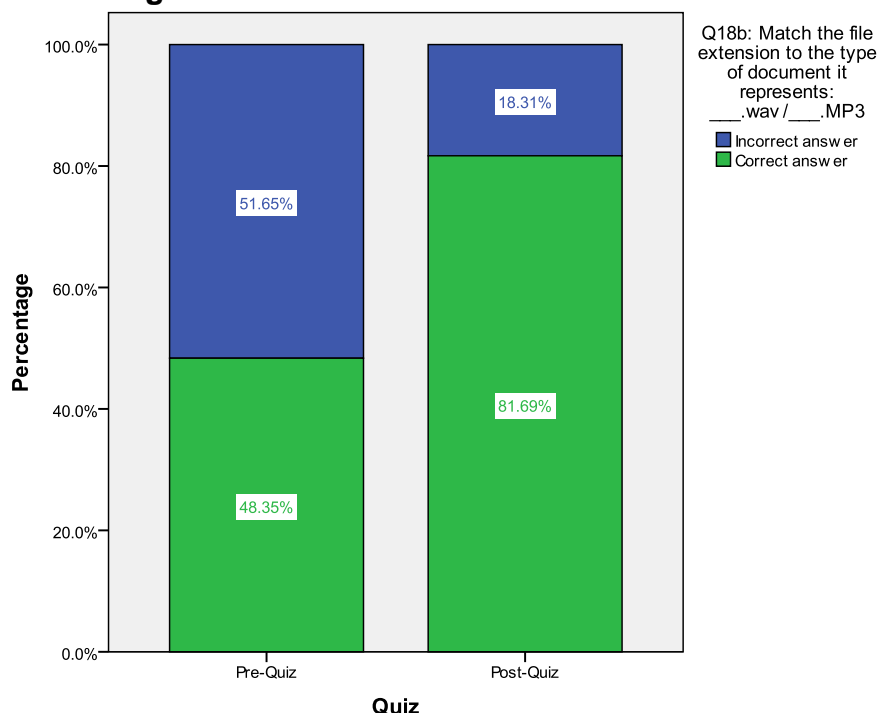
There was an improvement of 69% in the students' ability to identify the specific digital information format, namely sound. Forty-eight (48%) percent of the students (*n*=235) answered correctly in the pre-quiz, where-as 82% of the students (*n*=397)

answered correctly in the post-quiz.

According to the McNemar test (*p=.000*), this is statistically significant, which excludes the probability that this may have occurred by chance and therefore the change can be attributed to the DILP. The section on sound, in Unit 4 of the DILP, is therefore effective in enhancing this skill, because it includes links for students to listen to various audio clips, which address the characteristic of learning coupled with entertainment in the form of visual and audio information of Generation Z. This unit was also effective in preventing boredom, a characteristic of Generation Y.

6.5.23   Data for and interpretation of Question 18c pre- and post-quiz

Question 18c: For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension.			
Pre-quiz		Post-quiz	
a.___.jpg	1. Music/Audio	a.___.gif	1. Music/Audio
b.___.wav	2. Movie	b.___.MP3	2. Movie
c.___.avi	3. Image	c.___.MPEG	3. Graphic
d.___.gif	4. Graphic	d.___.jpg	4. Image
The correct answer is 2. *Movie*		The correct answer is 2. *Movie*	

Figure 6.30: Percentage of correct and incorrect answers - Question 18c
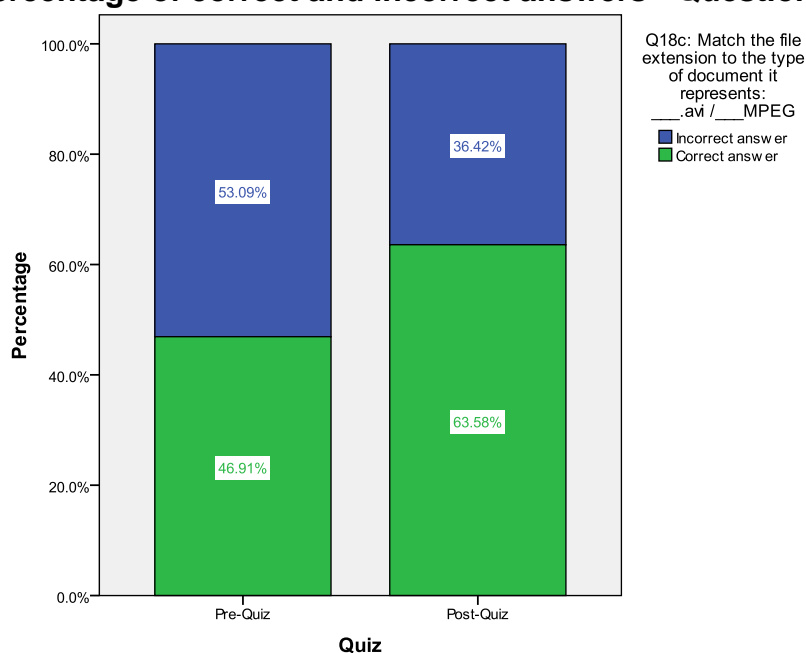
There was an improvement of 36% in the students' ability to identify the specific digital information format, namely videos and movies. Forty-seven percent (47%) of students (*n*=228) answered correctly in the pre-quiz, whereas 64% of the students (*n*=309) answered correctly in the post-quiz. This is statistically significant. According to the McNemar test the *p* value is 0.000*,* which excludes the probability that this may have occurred by chance and therefore the change can be attributed to the section, Videos and movies, in the DILP.

This unit includes a humorous video for the students to watch, which also addresses the learning coupled with entertainment in the form of visual and audio information characteristic of Generation Y and Z.

6.5.24 Data for and interpretation of Question 18d pre- and post-quiz

Question 18d: For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension.			
Pre-quiz		**Post-quiz**	
a.___.jpg	1. Music/Audio	a.___.gif	1. Music/Audio
b.___.wav	2. Movie	b.___.MP3	2. Movie
c.___.avi	3. Image	c.___.MPEG	3. Graphic
d.___.gif	4. Graphic	d.___.jpg	4. Image
The correct answer is 4. *Graphic*		The correct answer is 4. *Image*	

Figure 6.31: Percentage of correct and incorrect answers - Question 18d
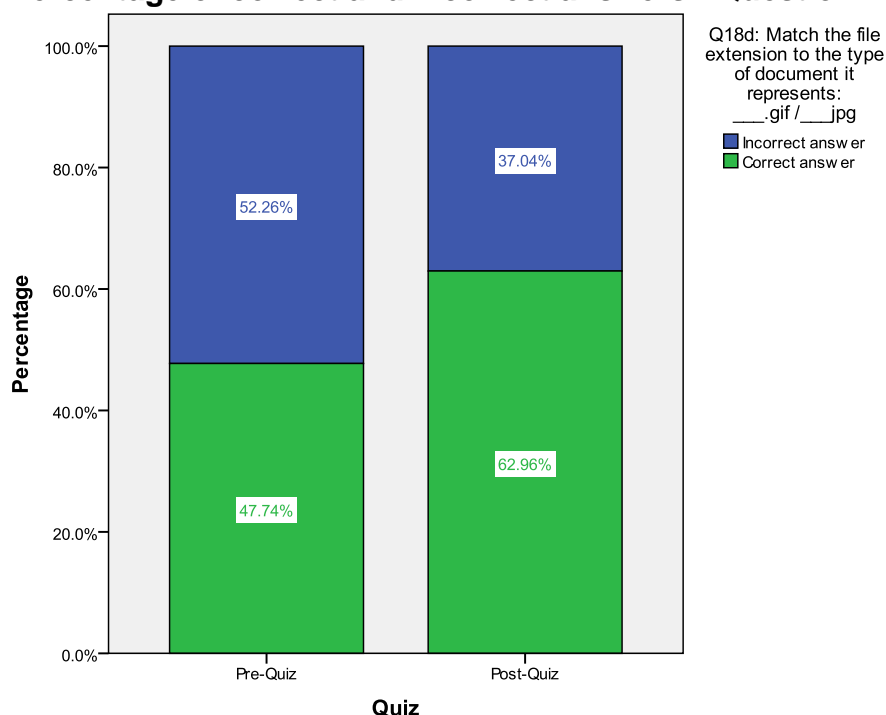
There was a 32% improvement in the students' ability to identify JPEGs as a specific digital information format. Forty-eight percent (48%) of the students (*n*=232) answered correctly in the pre-quiz, where as 63% of the students (*n*=306) answered correctly in the post-quiz. The statistical significance, according to the McNemar test, is *p*=0.000, which excludes the probability that this may have occurred by chance and therefore the treatment – the DILP – had an effect.

The DILP was more effective in assisting students to identify digital information formats such as sound, JPEG images, videos and movies than it was with GIF images. Students were able to answer Questions 18 b, c and d correctly in the post-quiz, but not Question 18 a, where students failed to identify GIF (Graphic Interchange Format) as an image. This may be due to the fact that students are more familiar with JPEGs than with GIFs. GIF is a graphic format normally used on the Web, which includes features that enable animation.

6.5.25 Data for and interpretation of Question 19 pre- and post-quiz

Question 19: How do you create a folder to store your images, sounds, videos and text?	
Pre-quiz	Post-quiz
a. click on My Documents, File, New, Folder and give it a name b. highlight a Folder in My Documents and use the arrow key to move the image or sound over c. highlight the image and drag and drop it into the Folder d. highlight the video and copy and paste it into the Folder	a. click on My Documents, File, New, Folder and give it a name b. restrict folders to a single document type e.g. pictures in one folder c. organise related information in separate folders d. a, b and c
The correct answer is a. *click on My Documents, File, New, Folder and give it a name*	The correct answer is d. *a, b and c*

Figure 6.32: Percentage of correct and incorrect answers - Question 19
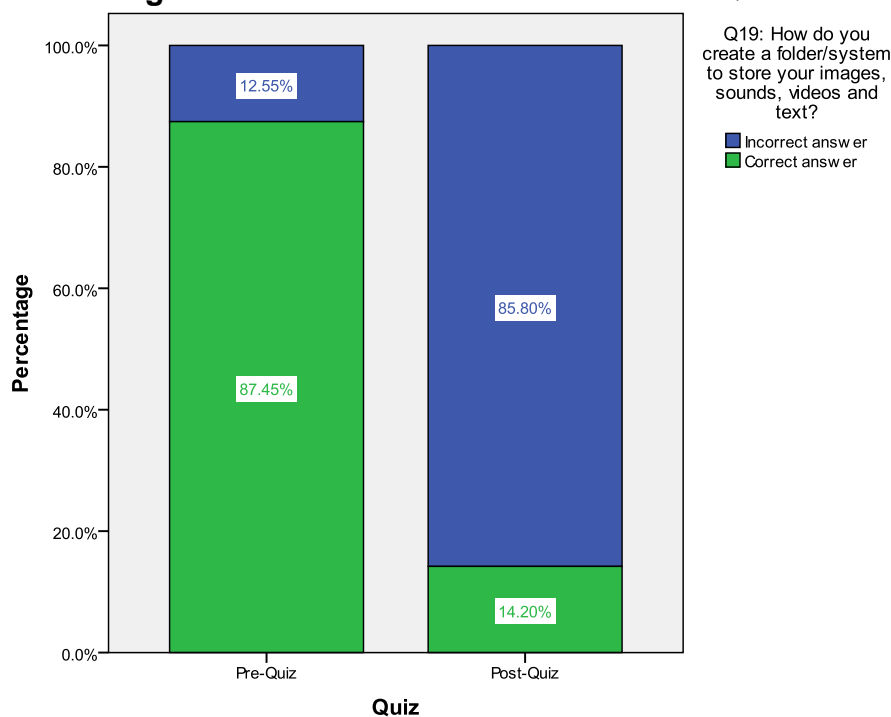
Students did not understand how to create a folder to store images, sounds, videos and text. There was an 84% decrease in answering the post-quiz correctly. In the pre-quiz, 87% of the students (n=425) answered correctly and only 14% of the students (n=69) answered correctly in the post-quiz. As a result, the McNemar test indicates the decrease as statistically significant (p=0.000).

The fact that so many students (87%) answered the pre-quiz correctly may be due to the fact that options b, c and d provided in the pre-quiz are impossible to execute. The distractors used were therefore implausible, making it more obvious for students to choose the correct option, namely a. It is recommended to rephrase this question if one considers using this outcomes assessment instrument again.

From the follow-up interviews for Question 19, to determine what possible problems and/or misunderstandings students could have experienced with the question, it is evident that the students (45%) felt that they had not learned enough or did not have enough knowledge to answer the question.

Figure 6.33: Themes arising from student responses to Question 19
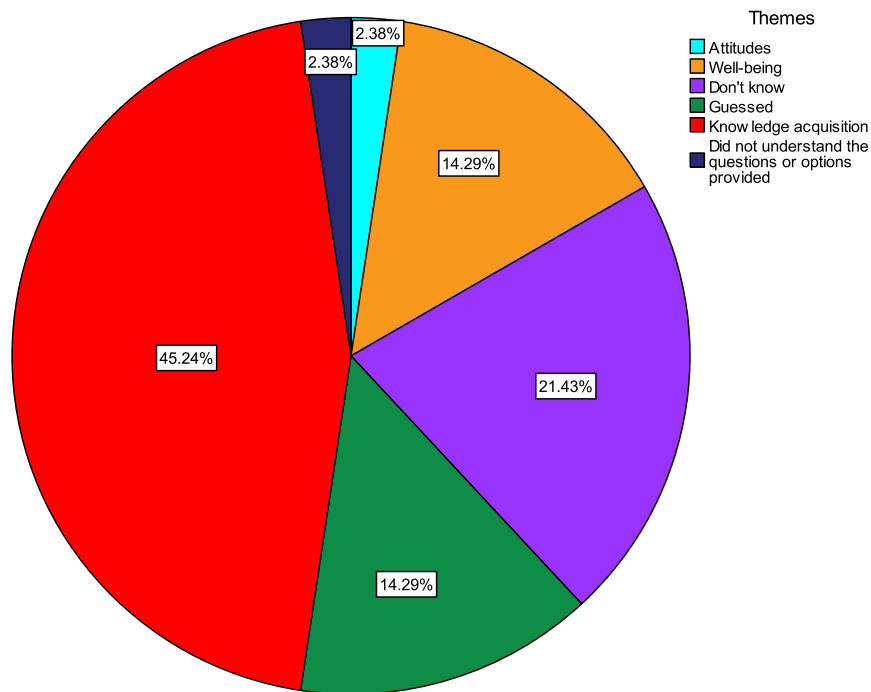
The DILP might have been more effective in enhancing the specific digital information literacy skill, namely to create a system for organising digital information, if students had the opportunity to re-do the specific section and then re-answer the question. The DILP uses the same wording (see Figure 6.34) as the options provided in the post-quiz. Re-doing this section might have improved memorisation and caused an improvement in students' ability to answer the post-quiz question correctly.

Figure 6.34: DILP, Unit 4, section on creating a system for organising digital information

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Create a system for organising digital information

First you need to create a folder for all your images, sounds and
videos and call it something like Downloads (this way you know
where to find all the images that you've downloaded from the Web)

1. Double click on **My Documents**.
2. Click on **File**, **New**, **Folder** and give it a name.

Tips:

▪ Restrict folders to a single document type, for example,
pictures in one folder, word documents in another.
▪ Organise related information in separate folders, for
example, all the assignments and information for **each** of
your subjects should be in separate folders.

←

Twenty-one percent (21%)of the students indicated that they did not know what possible problems students could have experienced with Question 19. They may have done so due to a lack of memory pertaining to Question 19 of the post-quiz, although the interviewer repeated Question 19 and its options during the telephonic interviews.

As mentioned previously, the multiple-choice questions in the pre- and post-quiz provide four possible responses as this reduces the probability of a correct guess to 25%. Fourteen percent (14%) of the students responded that they guessed the answer. Once again, guessing cannot be eliminated entirely.

Fourteen percent (14%) of the students acknowledged that they were not concentrating. Encouraging students to repeat the section and re-answer Question 19, might have caused the DILP to be more effective in enhancing the students' understanding of how to create a system for organising digital information.

The themes, *Did not understand the questions or options* and *Attitudes* are insignificant, with only two percent (2%) of the students indicating this as a possible problem experienced.

6.5.26 Data for and interpretation of Question 20 pre- and post-quiz

Question 20: Once you've found the digital information on the Web, you can capture (store) the information. Which of the following would work to capture the information?	
Pre-quiz	Post-quiz
a. copy and paste b. file and save as … c. print d. a, b and c	a. copy and paste b. save as type .html c. make a screen shot, paste in a Word document d. a, b and c
The correct answer is d. *a, b and c*	The correct answer is d. *a, b and c*

Figure 6.35: Percentage of correct and incorrect answers - Question 20
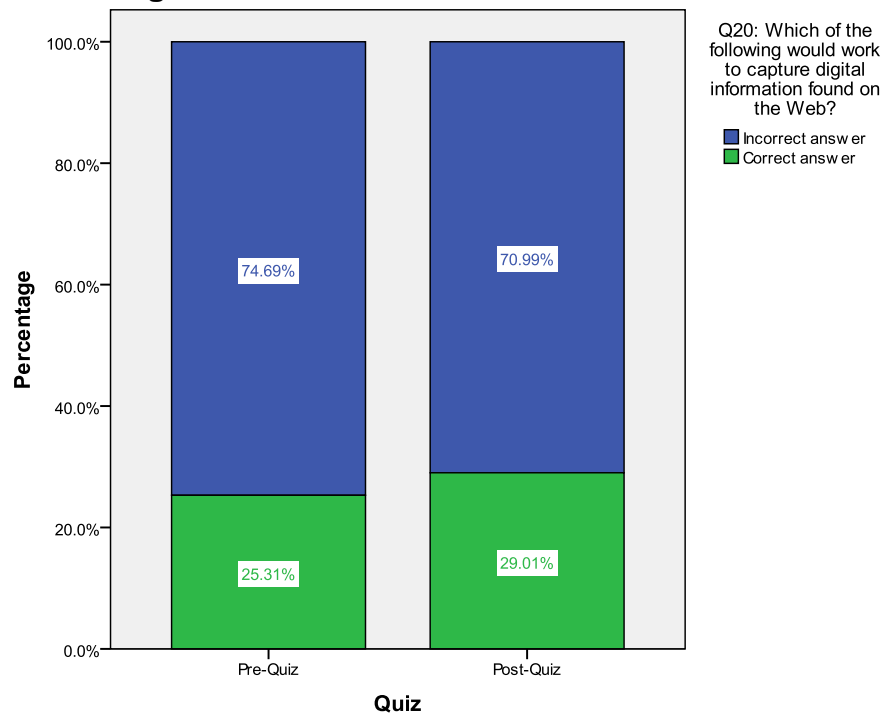
There was a 15% improvement in the students' ability to capture digital information and, according to the McNemar test, it is not statistically significant (McNemar test, p=0.133). After working through the DILP, 29% of the students (n=141) answered correctly in the post-quiz, whereas 25% of the students (n=123) answered the question correctly in the pre-quiz. The questions in the outcomes assessment instrument and the section, Capturing digital information, in Unit 4 of the DILP, seem to be sufficient.

6.5.27 Data for and interpretation of Question 21 pre- and post-quiz

Pre-quiz	Post-quiz
Question 21: Computer viruses can be stopped from spreading on your computer by downloading anti-virus software. a. True b. False c. Don't know The correct answer is *a. True*	Question 21: "A computer virus is a term used to describe malicious programs that install themselves onto a computer. Viruses will cause a range of damage, from the very mild to the entire loss of computer data" (adapted from Gil, 2009) a. True b. False c. Don't know The correct answer is *a. True*

Figure 6.36: Percentage of correct and incorrect answers - Question 21
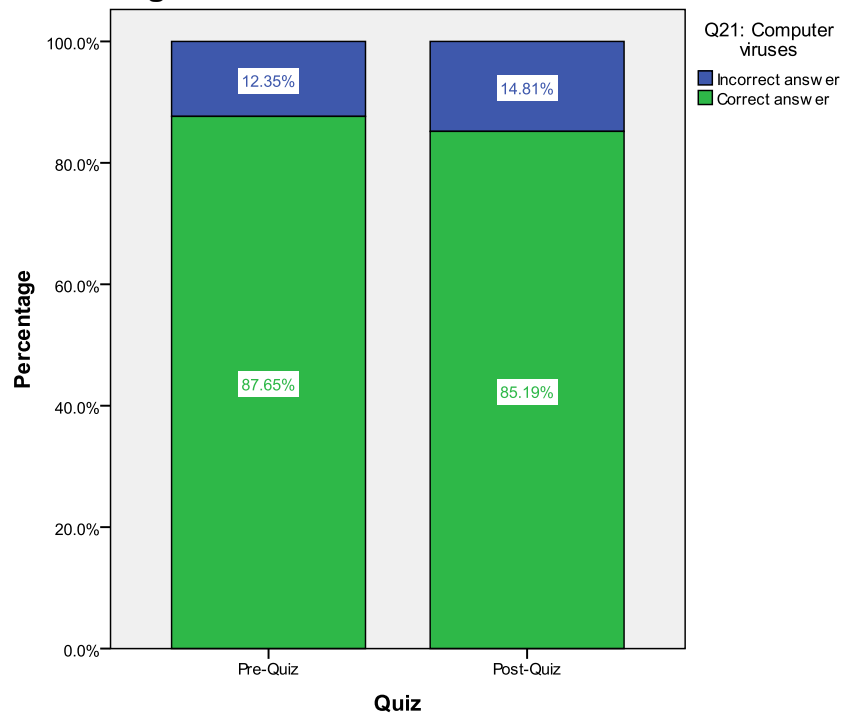
There was a slight decrease (3%) in the students' understanding of computer viruses. Eighty-eight percent (88%) of the students (n=426) answered correctly in the pre-quiz and 85% of the students (n=414) answered correctly in the post-quiz. According to the McNemar test (p = 0.246), this is not statistically significant.

No changes are therefore suggested for improving the section, Computer viruses, in Unit 4 of the DILP, in order to be more effective in enhancing the skill of taking precautions to prevent computer viruses. No adjustment to the outcomes assessment instrument is considered.

6.5.28 Data for and interpretation of Question 22 pre- and post-quiz

Question 22: Digital storytelling is the practice of using computer-based tools to tell stories.	
Pre-quiz	Post- quiz

Digital stories contain a mixture of only computer-based images and text.
 	
   a. True
   b. False
   c. Don't know
 	
	Digital stories contain a mixture of only computer-based text and video clips.
	
	   a. True
	   b. False
	   c. Don't know

The correct answer is b. *False*	The correct answer is b. *False*

Figure 6.37: Percentage of correct and incorrect answers - Question 22
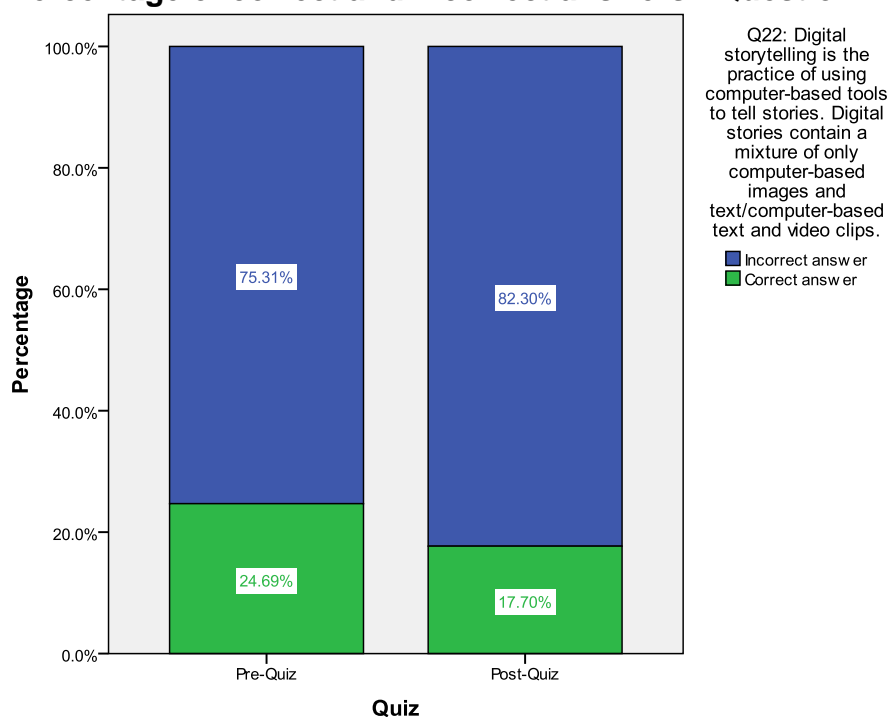
A decrease of 28% is seen in the students' understanding of digital storytelling. In the pre-quiz, 25% of the students (*n*=120) were able to answer correctly, as opposed to 18% of the students (*n*=86) who answered the question correctly in the post-quiz. This is statistically significant (McNemar test, *p*=0.004). Follow-up interviews were conducted, to determine what possible problems and/or misunderstandings the students

could have experienced with the question.

Figure 6.38 clearly indicates that the majority (83%) of the students did not understand the question. Perhaps students do not grasp the concept of digital storytelling as yet and therefore did not understand the question. Digital storytelling was one of the new learning technologies which was identified in Chapter 3, The integration of new technologies with the DILP, and was incorporated in the DILP during the revision in 2010. Digital storytelling is possibly not used widely in education in South Africa, but is considered a powerful educational tool to use when introducing subjects to students. Digital storytelling could also be used as an assignment format.

It would have been useful for students to return to this section in Unit 4 of the DILP to re-read it, watch the educational video again in order to get a better understanding of digital storytelling and then attempt to answer the post-quiz question again. This might have improved the effectiveness of the DILP.

Figure 6.38: Themes arising from student responses to Question 22
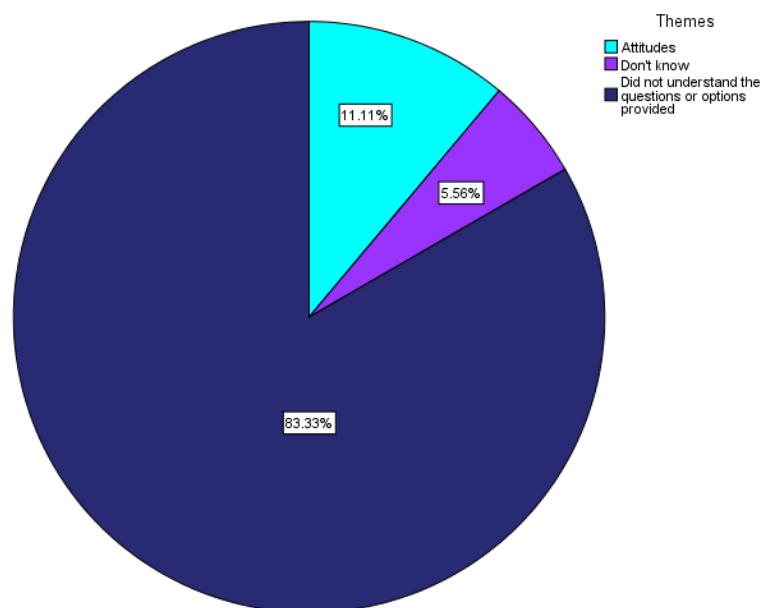
The *Attitudes* theme indicates that 11% of the students in the follow-up interviews were not interested and one of the students specifically remarked that he/she did not bother reading the information. Viewing the Youtube video on digital storytelling again, though, might have improved the situation. The six percent (6%) of students who answered *Don't know*, may have done so due to a lack of memory pertaining to Question 22.

6.5.29 Data for and interpretation of Question 23 pre- and post-quiz

Pre-quiz	Post-quiz

Question 23: Companies prevent people from using fee-based information by providing login codes and passwords; users pay ''per-use'' of the digital information or users pay a subscription fee.
 	
    a. True
    b. False
    c. Don't know
	Question 23: Databases containing journal articles usually require a login code and password because it does not allow free access to all Web users.
	
	    a. True
	    b. False
	    c. Don't know

The correct answer is a. *True*	The correct answer is a. *True*

Figure 6.39: Percentage of correct and incorrect answers - Question 23
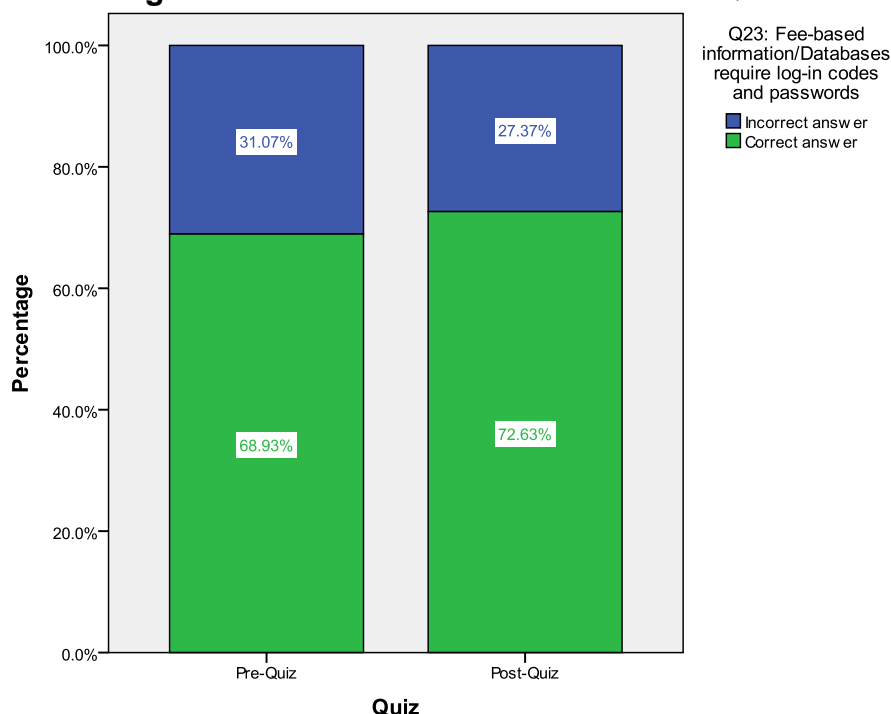
Students' understanding of free *versus* fee-based access to digital information increased by five percent (5%). Seventy-three percent (73%) of the students (*n*=353) answered the question correctly in the post-quiz, as opposed to 69% of students (*n*=335) who answered the pre-quiz correctly. Although this is not statistically significant (McNemar test, *p*=0.173), it does indicate that there was some degree of positive change. The questions in the outcomes assessment instrument and the specific section, Free *versus* fee-based information, in Unit 6 of the DILP, are therefore considered adequate.

6.5.30 Data for and interpretation of Question 24 pre- and post-quiz

Question 24: Copyright protection covers works that represent an original idea, in any format (text, music, pictures and video). What can you then print or copy to use in your assignments?	
Pre-quiz	Post-quiz
a. One article per issue of a journal b. Pictures, animations, graphics and	a. From a journal, not more than one article per issue

diagrammes c. 10% of digital sources (e.g. a Web site) if it is not divided into chapters (e.g digital books) d. a, b and c. The correct answer is d. a, b and c.	b. Graphics, video, sound and diagrammes c. 10% of a Web site d. a, b and c The correct answer is d. a, b and c

Figure 6.40: Percentage of correct and incorrect answers - Question 24
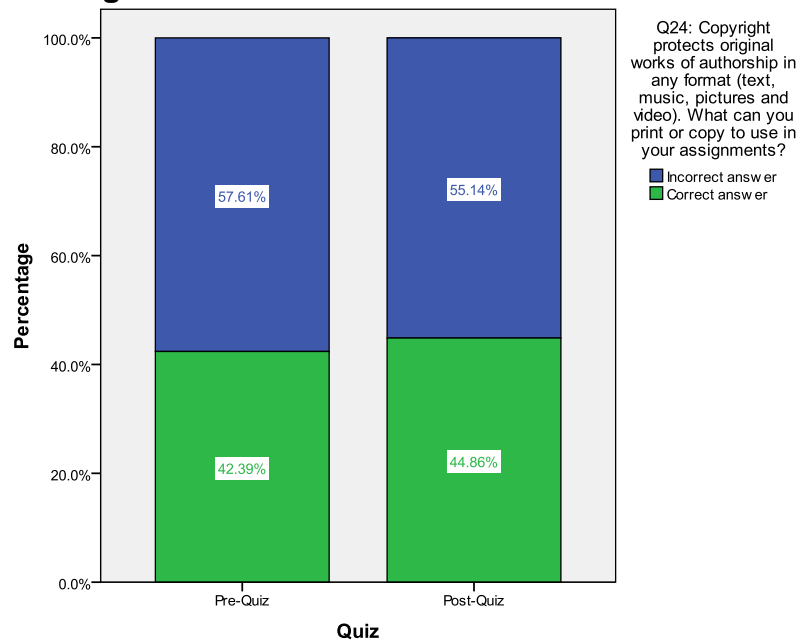
Forty-five percent (45%)of the students (n=218) could demonstrate an understanding of copyright in answering this question correctly in the post-quiz and 42% of students (n=206) could answer correctly in the pre-quiz, thus an increase of six percent (6%). This is not statistically significant (McNemar test, p=0.359), therefore no changes are necessary for the questions in the outcomes assessment instrument or the section, Copyright, in Unit 6 of the DILP.

6.5.31 Data for and interpretation of Question 25 pre- and post-quiz

Question 25: You want to use some of the information found in an online journal article for your assignment. Which situation requires that you cite the source of your information to prevent plagiarism?	
Pre-quiz	Post-quiz
a. When you copy a whole paragraph and indents the paragraph b. When you paraphrase a main point in your own words c. When you quote a sentence (using quotation marks) d. a, b and c	a. The source was quoted word for word, using quotation marks b. Only an idea was used in you assignment, the words were changed c. You've copy and pasted 1 sentence from a Web site into your assignment d. a, b and c
The correct answer is d. *a, b and c*	The correct answer is d. *a, b and c*

Figure 6.41: Percentage of correct and incorrect answers - Question 25
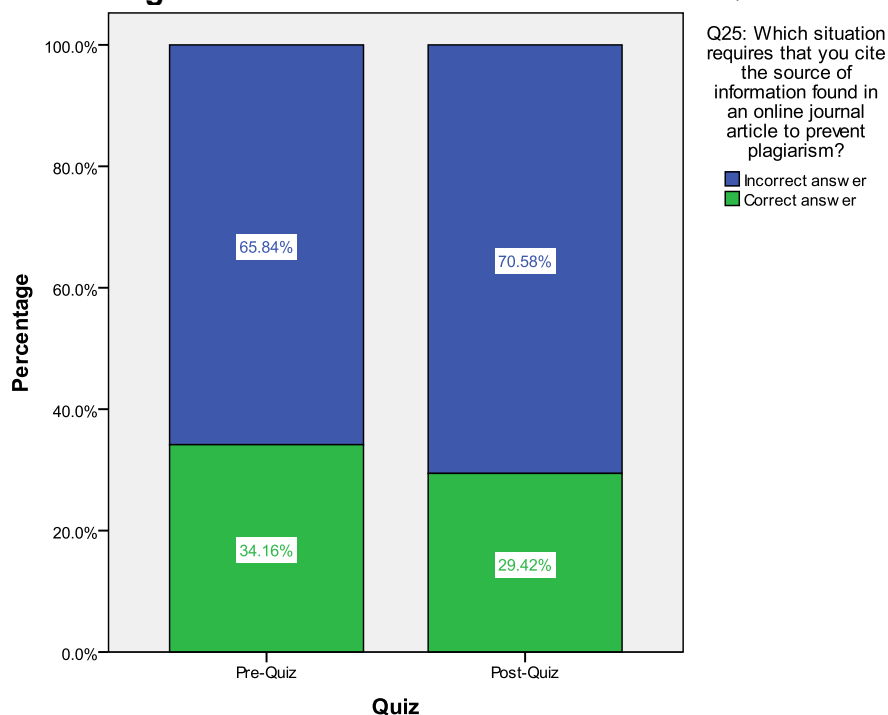
The results show a 14% decrease in students' understanding of the prevention of plagiarism, with 34% of the students (*n*=166) answering correctly in the pre-quiz and 29% of the students (*n*=143) answering correctly after completing the DILP. The decrease is, however, not statistically significant (McNemar test, *p*=0.071) and no

changes are suggested for improving the section, Plagiarism, in Unit 6 of the DILP, in order to be more effective in enhancing the skill of prevention of plagiariam. An adjustment to the outcomes assessment instrument, namely the pre- and post-quiz is also not considered.

6.5.32 Data for and interpretation of Question 26 pre- and post-quiz

Question 26: Take a look at the paragraph below. Assuming that you need to add some of this information into the assignment you are writing, please select from the citations (a-d) the correct way to cite the source (Remember we are using the Harvard Referencing style)	
Pre-quiz	Post-quiz

Original passage: (Copyright © The Nobel Foundation 1993)
 http://nobelprize.org/nobel_prizes/peace/laureates/1993/mandela-bio.html)
 	
 Nelson Mandela was released on February 11, 1990. After his release, he plunged himself wholeheartedly into his life's work, striving to attain the goals he and others had set out almost four decades earlier. In 1991, at the first national conference of the ANC held inside South Africa after the organization had been banned in 1960, Mandela was elected President of the ANC while his lifelong friend and colleague, Oliver Tambo, became the organisation's National Chairperson.
 	
   a. According to the Nobel Foundation (1993) Nelson Mandela was released on 11 February 1990.
   b. Nelson Mandela was released on February 11, 1990 (The Nobel Foundation, 1993)
   c. Nelson Mandela was released on the 11th of February in 1990 (The Foundation)
	Original passage: (Copyright © South African History Online, 2009).
	 http://www.sahistory.org.za)
	
	 Winnie Madikizela: She completed her degree in social work in 1955, and was offered a scholarship for further study in the USA. However she turned it down and opted for a challenging position as the first qualified Black medical social worker at the Baragwanath Hospital in Johannesburg instead.
	
	   a. Winnie Madikizela completed her degree in social work in 1955 (South African History Online)
	   b. According to South African History Online (2009) Winnie Madikizela completed her social work degree in 1955
	   c. Winnie Madikizela completed her degree in social work in 1955
	   d. Winnie Madikizela was offered a scholarship

d. a and b	for further study in the USA (2009)
The correct answer is d. *a and b*	The correct answer is b. *According to South African History Online (2009) Winnie Madikizela completed her social work degree in 1955*

Figure 6.42: Percentage of correct and incorrect answers - Question 26
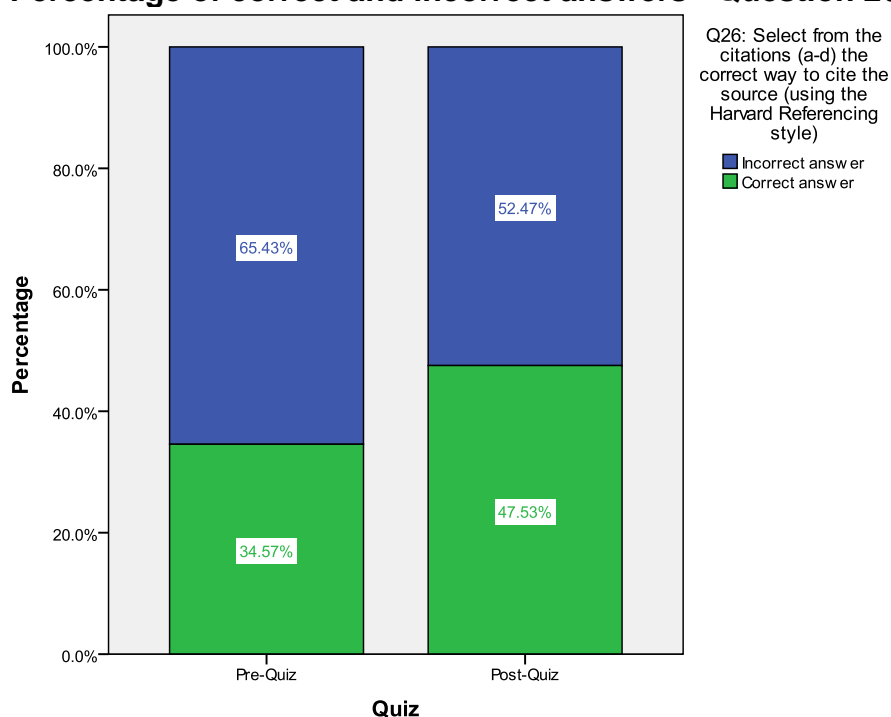
There was a 38% improvement in the students' ability to select the correct citation style. Forty-eight percent (48%) of students (*n*=231) answered correctly in the post-quiz, whereas 35% of the students (*n*=168) answered correctly in the pre-quiz. This is statistically significant according to the McNemar test (*p*=0.000), which excludes the probability that the improvement has occurred by chance and therefore the change can be attributed to the DILP.

The Citation section, in Unit 6 of the DILP, makes use of mouse overs to explain each part of a citation, which may have enhanced the digital information literacy skill of

students to identify a correct citation. This is consistent with the visual orientation characteristic of the generations. This section is thus considered to be effective in enhancing the digital information literacy skill of selecting an appropriate citation style. No adjustment to the outcomes assessment instrument is considered necessary.

6.5.33 Data for and interpretation of Question 27a pre- and post-quiz

Below are four references for different types of digital information sources. Match the numbered items in the gray box area to each reference by writing the correct number next to the reference you think it belongs to.

1. Book on the Internet
2. Periodical/journal/magazine article
3. Home page
4. Government publication

Pre-quiz	Post-quiz
a. ___ South African Revenue Service. 2009. *Income tax* [online]. Available on the Internet at: http://www.sars.gov.za (30 November 2009).	a. ___ South African Revenue Service. 2009. *Customs* [online]. Available on the Internet at: http://www.sars.gov.za (30 November 2009).
b. ___ African National Congress. 2009. *How to join the ANC* [online]. Available on the Internet at: http://www.anc.org.za (1 December 2009).	b. ___ African National Congress. 2009. *Donate to the ANC* [online]. Available on the Internet at: http://www.anc.org.za (1 December 2009).
c. ___ Mandela, M. 2001. Mandela on tour with ISES. *Refocus* [online], 2(7), Sept.:50-52. Available on the Internet at: http://www.sciencedirect.com (28 June 2010).	c. ___ Baleta, A. 2002. Confusion over Mandela's "support" of ANC HIV policy *The Lancet* [online], 359(9309), 9 March:855. Available on the Internet at: http://www.sciencedirect.com (3 December 2009).
d. ___ Graig, W.J. (ed.). 2000. *The Oxford Shakespeare* [online]. Available on the Internet at:	d. Gray, H. 2009*. Anatomy of the human body* [online]. Available on the Internet at: http://www.bartleby.com (2

http://www.bartleby.com (2 July 2010).	December 2009).
The correct answer for a is 4.	The correct answer for a is 4.

Figure 6.43: Percentage of correct and incorrect answers - Question 27a
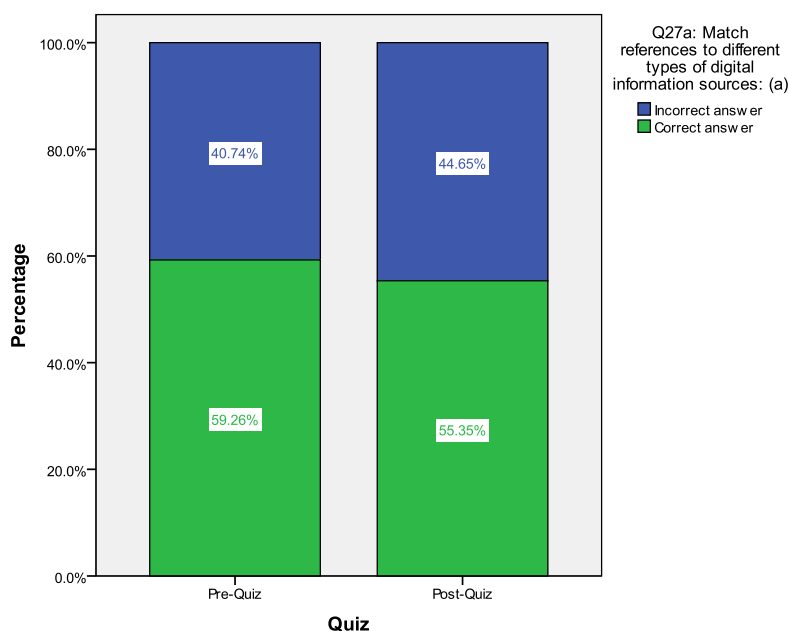
Although there was decrease of seven percent (7%) in students' ability to select the appropriate bibliographic reference style for a government publication, with 59% of the students (n=288) answering correctly in the pre-quiz and 55% of the students (n=269) who answered the post-quiz question correctly after working through the DILP.

The McNemar test (p=0.090) indicated that this is not statistically significant and no adjustment to the government publication option provided in the outcomes assessment instrument or to Unit 6, section Bibliographic reference style, in the DILP, is considered necessary.

6.5.34 Data for and interpretation of Question 27b pre- and post-quiz

Question 27b: Below are four references for different types of digital information sources. Match the numbered items in the gray box area to each reference by writing the correct number next to the reference you think it belongs to.

> 1. Book on the Internet
> 2. Periodical/journal/magazine article
> 3. Home page
> 4. Government publication

Pre-quiz	Post-quiz
a. ___ South African Revenue Service. 2009. *Income tax* [online]. Available on the Internet at: http://www.sars.gov.za (30 November 2009).	a. ___South African Revenue Service. 2009. *Customs* [online]. Available on the Internet at: http://www.sars.gov.za (30 November 2009).
b. ___ African National Congress. 2009. *How to join the ANC* [online]. Available on the Internet at: http://www.anc.org.za (1 December 2009).	b. ___ African National Congress. 2009. *Donate to the ANC* [online]. Available on the Internet at: http://www.anc.org.za (1 December 2009).
c. ___ Mandela, M. 2001. Mandela on tour with ISES. *Refocus* [online], 2(7), Sept.:50-52. Available on the Internet at: http://www.sciencedirect.com (28 June 2010).	c. ___ Baleta, A. 2002. Confusion over Mandela's "support" of ANC HIV policy *The Lancet* [online], 359(9309), 9 March:855. Available on the Internet at: http://www.sciencedirect.com (3 December 2009).
d. ___ Graig, W.J. (ed.). 2000. *The Oxford Shakespeare* [online]. Available on the Internet at: http://www.bartleby.com (2 July 2010).	d. ___Gray, H. 2009. *Anatomy of the human body* [online]. Available on the Internet at: http://www.bartleby.com (2 December 2009).
The correct answer for b is 3.	The correct answer for b is 3.

Figure 6.44: Percentage of correct and incorrect answers - Question 27b
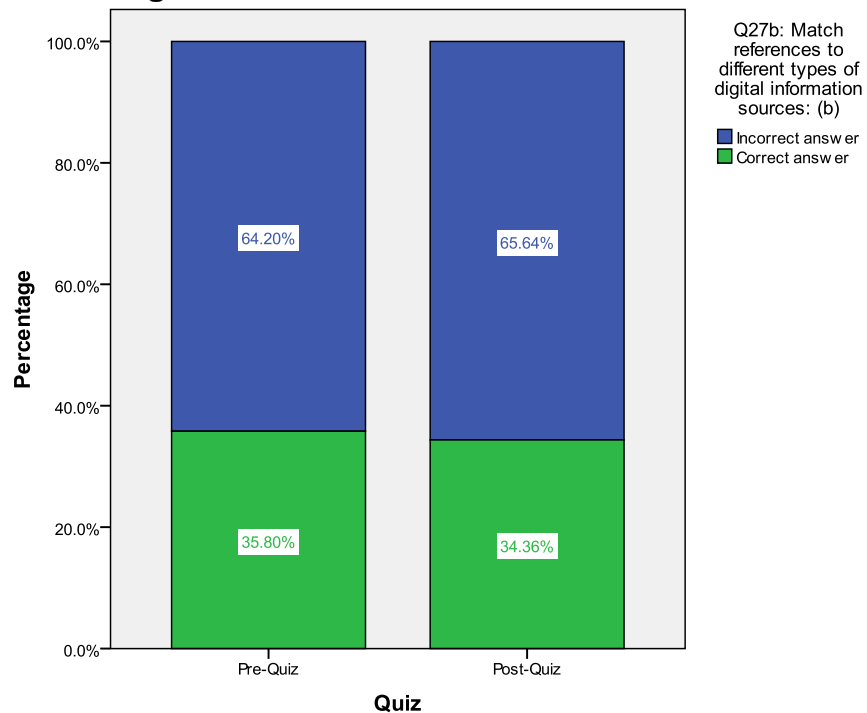
As in the case of Question 27a, there was also a slight decrease (4%) in students' ability to select the appropriate bibliographic reference style for a home page, with 36% of the students (n=174) answering correctly in the pre-quiz and 34% of the students (n=167) answering correctly after completing the DILP. According to the McNemar test (p=0.608), this is not statistically significant and therefore no adjustments are considered for changing option b. Home page, provided in the quizzes or to Unit 6, section Bibliographic reference style, in the DILP.

6.5.35 Data for and interpretation of Question 27c pre- and post-quiz

Question 27c: Below are four references for different types of digital information sources. Match the numbered items in the gray box area to each reference by writing the correct number next to the reference you think it belongs to.

> 1. Book on the Internet
> 2. Periodical/journal/magazine article
> 3. Home page
> 4. Government publication

Pre-quiz	Post-quiz
a. ___ South African Revenue Service. 2009. *Income tax* [online]. Available on the Internet at: http://www.sars.gov.za (30 November 2009).	a. ___South African Revenue Service. 2009. *Customs* [online]. Available on the Internet at: http://www.sars.gov.za (30 November 2009).
b. ___ African National Congress. 2009. *How to join the ANC* [online]. Available on the Internet at: http://www.anc.org.za (1 December 2009).	b. ___ African National Congress. 2009. *Donate to the ANC* [online]. Available on the Internet at: http://www.anc.org.za (1 December 2009).
c. ___ Mandela, M. 2001. Mandela on tour with ISES. *Refocus* [online], 2(7), Sept.:50-52. Available on the Internet at: http://www.sciencedirect.com (28 June 2010).	c. ___ Baleta, A. 2002. Confusion over Mandela's "support" of ANC HIV policy *The Lancet* [online], 359(9309), 9 March:855. Available on the Internet at: http://www.sciencedirect.com (3 December 2009).
d. ___ Graig, W.J. (ed.). 2000. *The Oxford Shakespeare* [online]. Available on the Internet at: http://www.bartleby.com (2 July 2010).	d. ___Gray, H. 2009. *Anatomy of the human body* [online]. Available on the Internet at: http://www.bartleby.com (2 December 2009).
The correct answer for c is 2.	The correct answer for c is 2.

Figure 6.45: Percentage of correct and incorrect answers - Question 27c
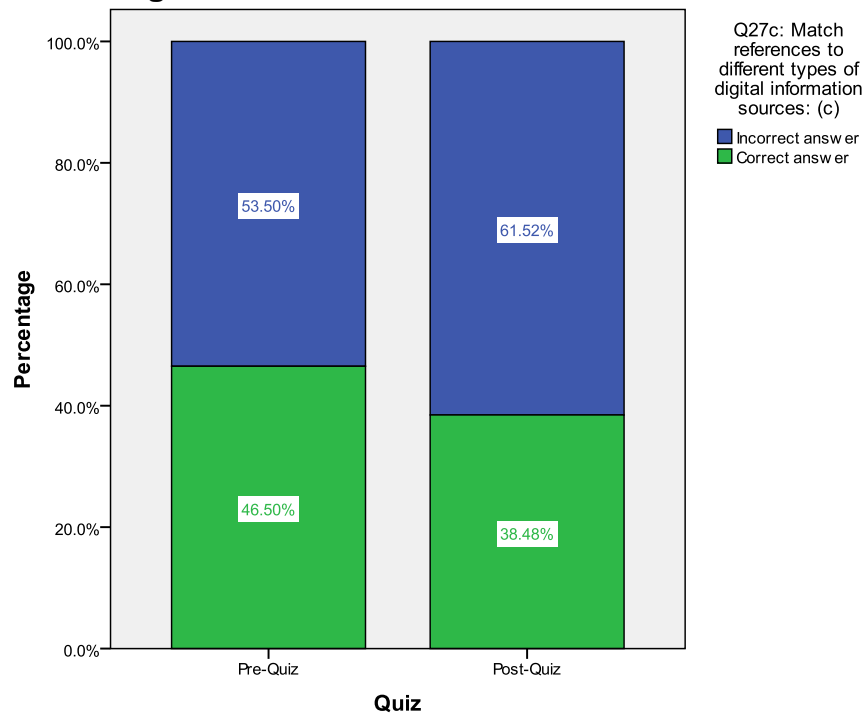
A decrease of 17% in the students' ability to select the appropriate bibliographic reference style for an article from a journal or periodical is calculated. In the pre-quiz, 47% of the students (*n*=226) were able to answer correctly, as opposed to 38% of the students (*n*=187) who answered the question correctly in the post-quiz and this was statistically significant (McNemar test, *p*=0.004).

Follow-up interviews were conducted to establish possible problems and/or misunderstandings the students could have experienced with the question. Seventy-nine percent (79%) of the students commented that they did not understand the question or the options provided (see Figure 6.46).

Figure 6.46: Themes arising from student responses to Question 27c
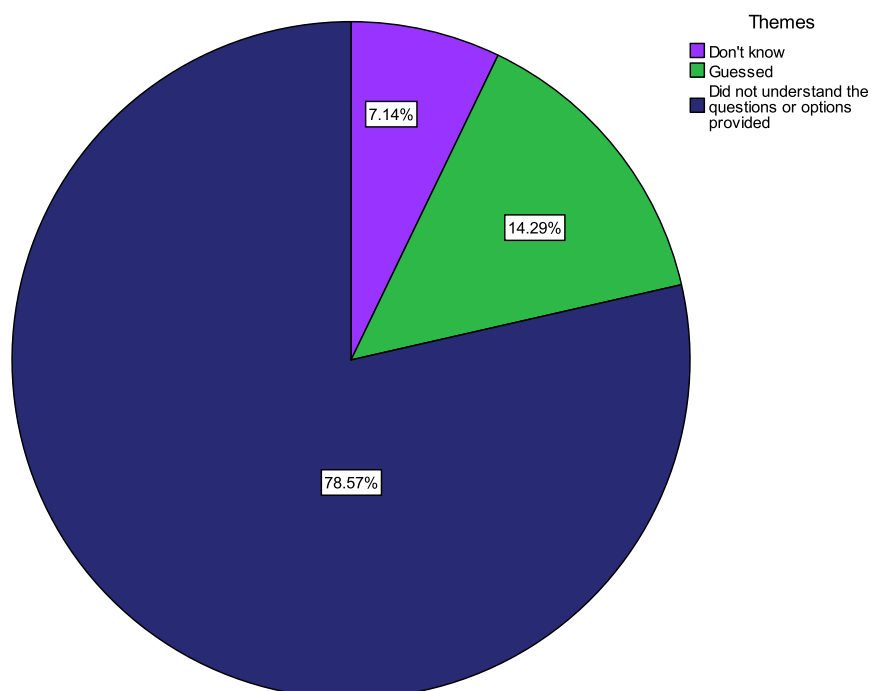
This was surprising, as the question was the same for the previous questions (27a and 27b) and only the option provided, which is the bibliographic reference for an article from a journal/periodical, was different. Upon further investigation, students indicated that it was the option of a journal/periodical article which was confusing. They could have found the answer/option for an article from a journal/periodical more confusing, as it is more difficult to do a bibliographic reference for an article from a journal/periodical, because there are more fields involved, than, for instance, for that of a home page.

The DILP also provides an example of a bibliographic reference for an article from a journal, in Unit 6, with mouse overs which explain each field. Perhaps students can revisit this section and re-answer the question to get a better understanding of what a bibliographic reference for an article should look like. This might have improved the DILP's effectiveness in enhancing the skill of selecting an appropriate bibliographic reference style for articles from journals/periodicals.

During the construction of the outcomes assessment, four possible answers were provided for this specific matching exercise question, to reduce the likelihood of passing

the test by guessing, as four possible responses reduce the probability of a correct guess to 25%. However, 14% of the students indicated that they had guessed the answer. The guessing of answers in quizzes can, unfortunately, not be eliminated. The seven percent (7%) of students who answered that they do not know, once again, may have done so due to a lack of memory pertaining to Question 27c.

6.5.36 Data for and interpretation of Question 27d pre- and post-quiz

Question 27d: Below are four references for different types of digital information sources. Match the numbered items in the gray box area to each reference by writing the correct number next to the reference you think it belongs to.

> 1. Book on the Internet
> 2. Periodical/journal/magazine article
> 3. Home page
> 4. Government publication

Pre-quiz	Post-quiz
a. ___ South African Revenue Service. 2009. *Income tax* [online]. Available on the Internet at: http://www.sars.gov.za (30 November 2009).	a. ___South African Revenue Service. 2009. *Customs* [online]. Available on the Internet at: http://www.sars.gov.za (30 November 2009).
b. ___ African National Congress. 2009. *How to join the ANC* [online]. Available on the Internet at: http://www.anc.org.za (1 December 2009).	b. ___ African National Congress. 2009. *Donate to the ANC* [online]. Available on the Internet at: http://www.anc.org.za (1 December 2009).
c. ___ Mandela, M. 2001. Mandela on tour with ISES. *Refocus* [online], 2(7), Sept.:50-52. Available on the Internet at: http://www.sciencedirect.com (28 June 2010).	c. ___ Baleta, A. 2002. Confusion over Mandela's "support" of ANC HIV policy *The Lancet* [online], 359(9309), 9 March:855. Available on the Internet at: http://www.sciencedirect.com (3 December 2009).
d. ___ Graig, W.J. (ed.). 2000. *The Oxford Shakespeare* [online]. Available on the Internet at: http://www.bartleby.com (2 July	d. ___Gray, H. 2009. *Anatomy of the human body* [online]. Available on the Internet at: http://www.bartleby.com (2 December

2010).	2009).
The correct answer for d is 1.	The correct answer for d is 1.

Figure 6.47: Percentage of correct and incorrect answers - Question 27d
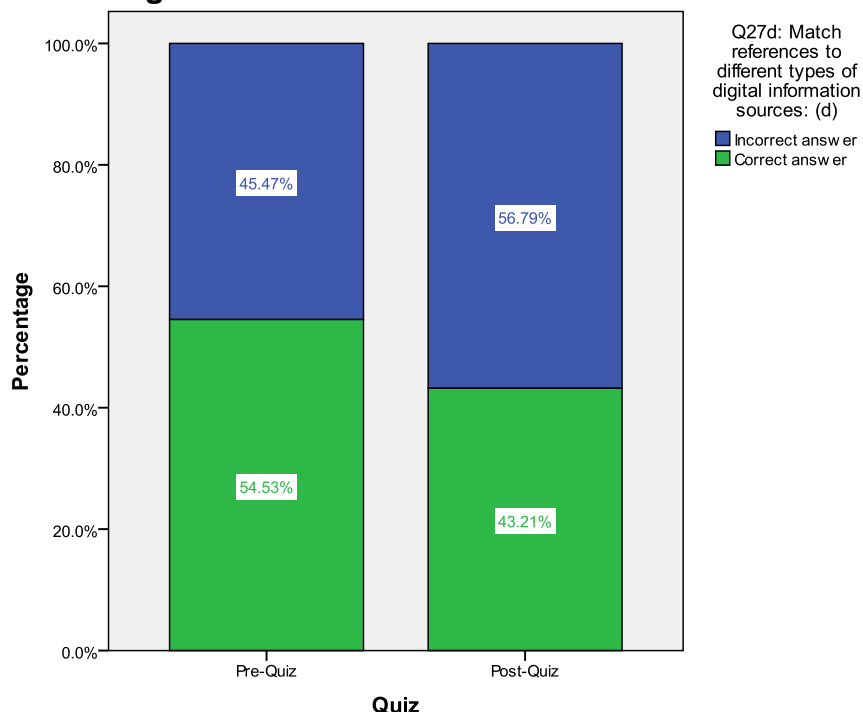
A decrease of 21% is noted in the students' ability to select an appropriate bibliographic reference style, in this instance, for a digital book. Fifty-five percent (55%) of the students (n=265) answered correctly in the pre-quiz and 43% of the students (n=210) answered correctly in the post-quiz.

This decrease is statistically significant (McNemar test, p=0.000) and follow-up interviews had to be conducted to understand what possible problems and/or misunderstandings the students could have experienced with the question. It is apparent from Figure 6.48 that the students did not understand the question or options provided.

Again, this was surprising as the question was the same for the previous questions (27a and 27b), apart from the option provided, namely a bibliographic reference for a digital

book. The DILP offers a bibliographic referencing activity for the exact same book in Unit 6. The same suggestion can therefore be made as for Question 27c.

Students can re-do the activity and attempt to re-answer the question to get a better understanding of the option provided. This may improve the DILP's effectiveness in enhancing the skill of selecting an appropriate bibliographic reference style for a digital book.

Figure 6.48: Themes arising from student responses to Question 27d
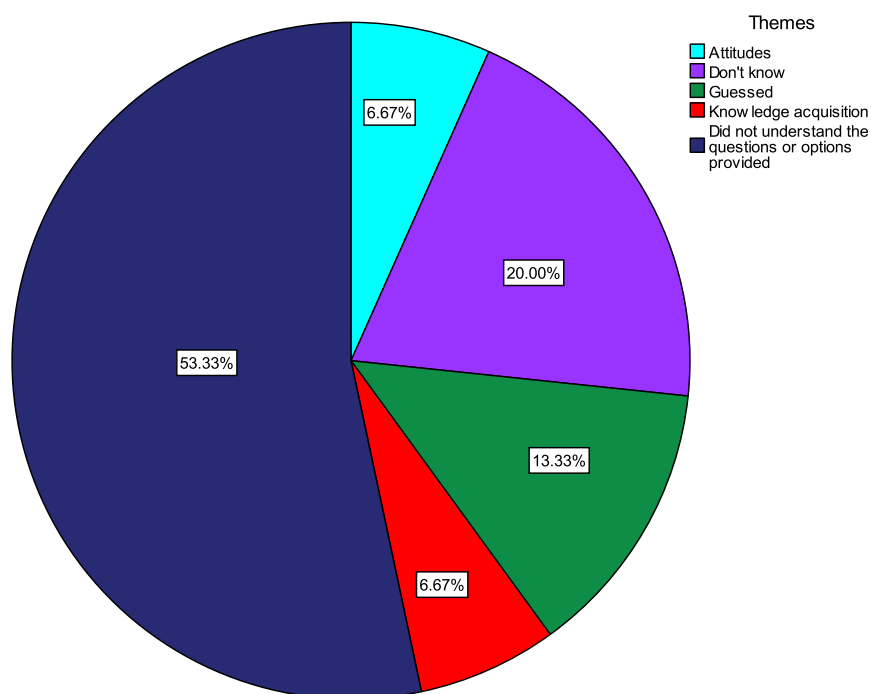
A lack of memory of Question 27d may have caused 20% of the students to answer that they did not know what possible problems or misunderstandings students could have experienced with Question 27d.

Thirteen percent (13%) of students indicated they had guessed the answer. As in the case of Question 27c, four possible answers were provided to reduce the probability of a correct guess to 25%, but guessing cannot be eliminated when using quizzes.

With seven percent (7%) of students indicating that they did not have enough

knowledge to answer this question correctly, it may again be helpful for students to have another look at Unit 6 of the DILP which has an interactive bibliographic referencing activity for the same digital book. The other seven percent (7%) who showed no interest in answering the question, may have been persuaded to also redo the interactive bibliographic referencing activitiy.

In summary, Question 27 had the same stem, but the options provided for Questions 27c and 27d confused the students. A repeat of the section, Bibliographic reference style for various digital information sources, in the DILP, may be useful in helping students understand the different bibliographic reference styles for digital books and articles from digital journals/periodicals.

6.5.37 Data for and interpretation of Question 28 pre- and post-quiz

Question 28: Organising what you have found will help you to understand the digital information. One way of organising your digital information is to create an outline. An outline arranges information by identifying main headings, subheadings and details under the subheadings.	
Pre-quiz	Post quiz
Which one of the following figures do you think represents the best way of organising vegetarianism? a. Figure 1 b. Figure 2 c. Figure 3 d. a, b and c The correct answer is d. *a, b and c* *N.B.: please refer to Appendix F, Digital information literacy pre-and post-quiz and answer key and scoring sheets to view the Figures.*	Which one of the following figures do you think represents the best way of organising information on general health? a. Figure 1 b. Figure 2 c. Figure 3 d. Figure 4 The correct answer is c. *Figure 3* *N.B.: please refer to Appendix F, Digital information literacy pre-and post-quiz and answer key and scoring sheets to view the Figures.*

Figure 6.49: Percentage of correct and incorrect answers - Question 28
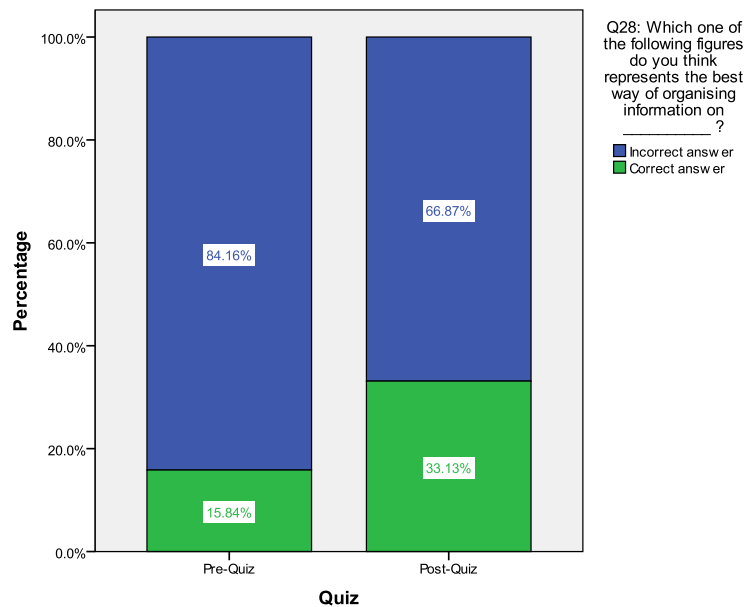
There was a significant improvement of 109% in the students' insight of how digital information can be organised. Sixteen percent (16%) of students (*n*=77) answered correctly in the pre-quiz, whereas 33% of the students (*n*=161) answered correctly in the post-quiz. This is statistically significant, according to the McNemar test (*p*=0.000).

The change can therefore be attributed to the treatment – the DILP – which excludes the probability that this may have occurred by chance. The section named Organise in Unit 6 as well as the interactive organising activity are therefore considered to be effective in enhancing the skill of organising digital information. Once again the positive outcome can also be attributed to the fact that when Generation Y and Z is guided on organising digital information students do better since the characteristic of lack of critical thinking skills are addressed. The pre- and post-quiz questions are also considered adequate.

6.5.38 Data for and interpretation of Question 29 pre- and post-quiz

Question 29: The process of integrating your information from the digital sources you have gathered, and then creating your own information product (an assignment), is called synthesising. Do you think the following is a good example of what an assignment should look like? (Considering that this is a shortened version of an assignment)

Pre-test	Post-test
J.S. MOEKOENA STUDENT NUMBER: 9603447 ND: CLINICAL THERAPY CLINICAL THERAPY II PET THERAPY Lecturer: Mrs M. Mothobi Date: 24 March 2010	ND: MANAGEMENT Human Resource Management II MANAGING ABSENTEEISM Lecturer: Mrs B Mokoena Date: 1 March 2009 Name: Ms CZ Mbilini Student number: 9603447

Pre-test

1.Introduction

Therapy means the treatment of physical or mental disorders by non-surgical methods; for example occupational therapy, physiotherapy or psychotherapy. In pet therapy the special qualities that pets have are exploited to help people with problems. Pet therapy is used with, inter alia, disturbed children and handicapped people.

2. Pet therapy and the elderly

Old people living in South Africa today have specific problems. Research shows that x% live on incomes of less than R200 per month; y% have no contact with their families; z% depend on church support groups for food and clothing (Human Sciences Research Council, 1994:78-79). It is perhaps this last quality that makes them so potentially therapeutic for old people. As Yvonne Carmen (1994:58) points out, they give comfort and solace to lonely residents of old-age homes.

3. Projects in Cape Town

Pet therapy in Cape Town began in an experimental way in 1992 as a project of the XXX (Behr, 1993:45).

Post-test

1.Introduction

Absenteeism is a costly and disruptive problem and places unnecessary pressure on staff that are at work. Until they investigate, companies normally do not realize the cost of absenteeism until they actually measure it.

2.Reasons for absenteeism

According to Van der Merwe (1988:7-8) the reasons for absenteeism can be divided in three categories, namely personal factors, organisational factors and attitudinal factors. Markowich (1996:116) states that some employees have the mentality that the "time is due to me - whether I'm sick or not", or see sick leave as "use-or-lose benefits".

3.Effects of absenteeism

Absenteeism has many devastating effects on organisations all around the world. Perry (1997:9) states that: "The real cost of chronic absenteeism then is lowered morale among other employees who must should the work load and lost revenue"

This proved very successful. Measures of emotional well-being showed that regular contact with pets benefitted the residents of two old-age homes in Lansdowne and Bellville. **4.Conclusion** These projects prove the value of pet therapy for old people. The great advantage of pet therapy is its relatively low cost. The needs of the elderly are huge but resources are small. Volunteers can be used in pet therapy programmes as no specialised training is needed. **Bibliography** BEHR, J.A. 1993. Pet therapy and the elderly: a case study. *Compos mentis*, [online], 10 (3):45-49. Available at: http://www.cp.ac.za (7 Jan. 2010). CARMEN, Yvonne. 1994. *Along came a dog* [online]. Available at: http://www.edwardarnold.co.uk (1 Feb. 2010) HUMAN SCIENCES RESEARCH COUNCIL. 1994. *Report on the living standards of the elderly in South Africa* [online]. Available at: http://www.hsrc.org.za (2 Mar.2010) a. No b. Yes c. Don't know	**4.Conclusion** What became clear in this study was that it is extremely important for staff to see that absenteeism would not be tolerated, otherwise it would lead to worsening absenteeism and a host of other negative effects on the workers and on the organisation. The sooner management and supervisors act on absenteeism, the better for the department, organisation and the employees. **Bibliography** Markowich, M M. & Eckberg, S. 1996. Get control of the absentee-minded. *Personnel Journal* [online], 115-120, December. Available at: http://www.jp.ac.ru (1 Feb. 2010) Perry, P M. 1997. Confronting the no-show*. American Nurseryman* [online], 185:89-95, January 15. Available at http://www.americannurse.com (7 Feb. 2010) Van der Merwe, R. Miller, S. 1988. *Measuring absence and labour turnover* [online]. Available at: http://www.lexiconpublishers.co.za (31 Jan. 2010) a. No b. Yes c. Don't know
The correct answer is b. *Yes.*	The correct answer is b. *Yes*

Figure 6.50: Percentage of correct and incorrect answers - Question 29
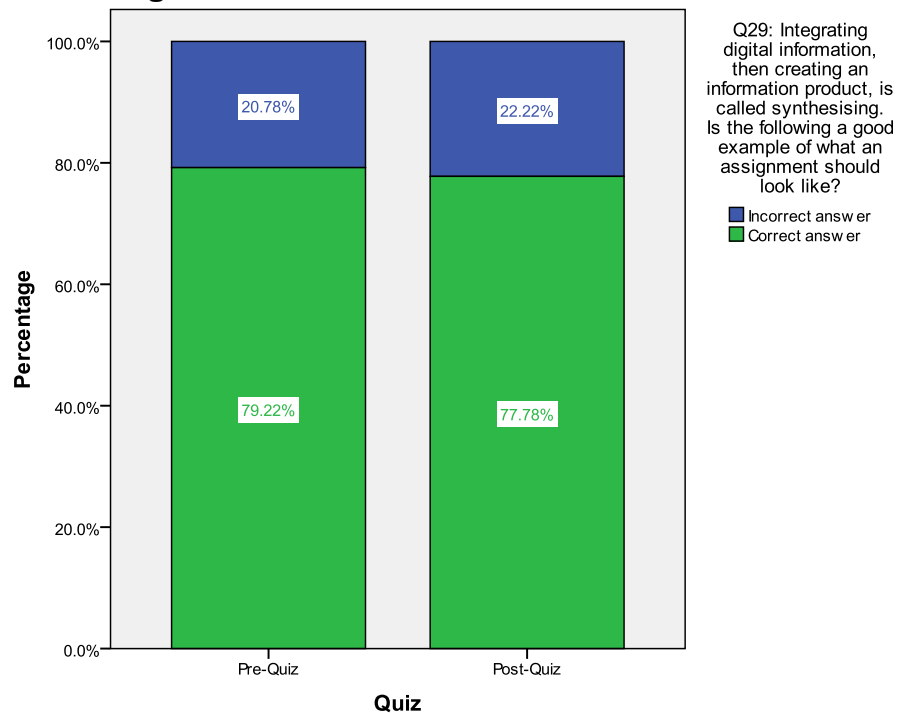
There was a slight decline of two percent (2%) in students' perception of synthesising digital information, with 79% of the students (*n*=385) answering correctly in the pre-quiz and 78% of the students (*n*=378) answering correctly after working through the DILP. This decrease is, however, not statistically significant (McNemar test, *p*=0.562).

Therefore no changes are suggested for improving the section, Synthesising, in Unit 6 of the DILP, in order to be more effective. An adjustment to the questions in the pre- and post-quiz is also not considered.

6.5.39 Data for and interpretation of Question 30 pre- and post-quiz

Question 30: Which one of the following is not a current awareness service?	
Pre-quiz	Post-quiz
a. RSS (Real Simple Syndication) feeds b. e-mail alerts c. Facebook d. Blogs	a. Twitter b. E-mail alerts c. Discussion group d. Blogs
The correct answer is c. *Facebook*	The correct answer is c. *Discussion group*

Figure 6.51: Percentage of correct and incorrect answers - Question 30
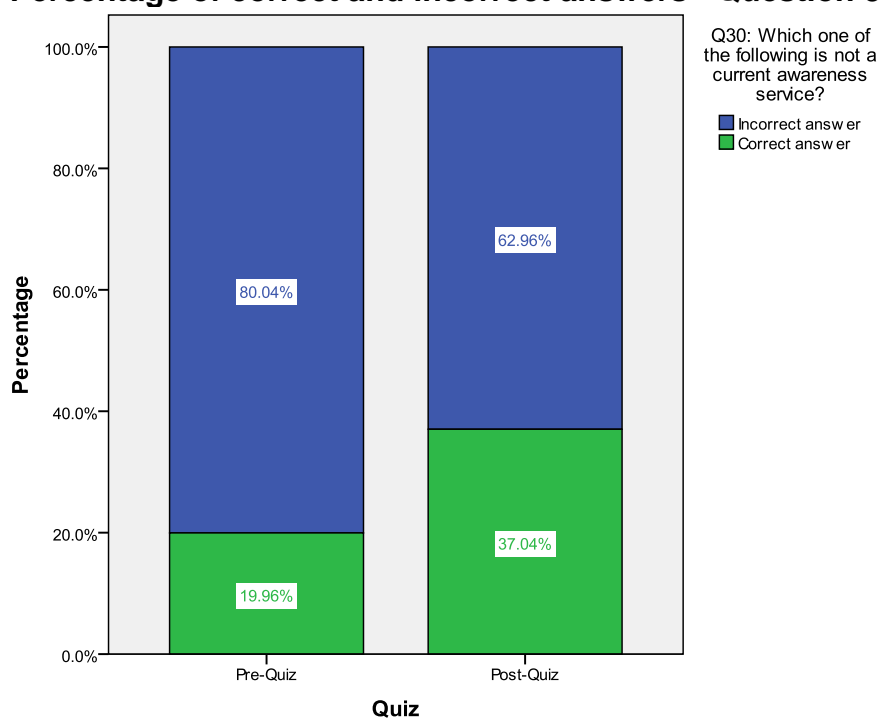
The increase of 86% in the students' understanding of current awareness services, is statistically significant, according to the McNemar test (p=0.000). Twenty percent (20%) of students (n=97) answered correctly in the pre-quiz, whereas 37% of the students (n=180) answered correctly in the post-quiz.

The probability that this may have occurred by chance is excluded and therefore the

change can be attributed to the DILP. Unit 7 in the DILP, Keeping up to date with digital information sources, is therefore considered effective in enhancing the digital skills of students, specifically relating to current awareness services. The effectiveness might have been caused due to the incorporation of new learning technologies as was discussed in Chapter 3. RSS, blogs and Twitter were included and explained in this section and educational videos from YouTube were added.

This addressed the characteristics of visual orientation (Generation Y), the learning coupled with entertainment (Generation Z), and using technology as motivation (both generations), which may have improved the effectiveness of the DILP in enhancing students' current awareness skills.

This section, 6.5 Presentation of data and interpretation, used descriptive statistics to describe the data obtained from the pre- and post-quizzes and follow-up interviews, with inferences that extend beyond the data. Judgements of the probability that an observed difference is statistically significant were also made, followed by in-depth interpretations of the data.

The following section will provide the interpretation of the qualitative data obtained from student feedback in the follow-up interviews for the three general questions pertaining to the program. These questions were open-ended questions (see Appendix H, Follow-up interview question sheets).

6.6   Interpretation of the qualitative data from student feedback pertaining to the program

The data collected during the follow-up interviews with students will be presented using pie charts and are also interpreted.

6.6.1 Results for the question: What did you like about the program?

Figure 6.52: What did you like about the program?
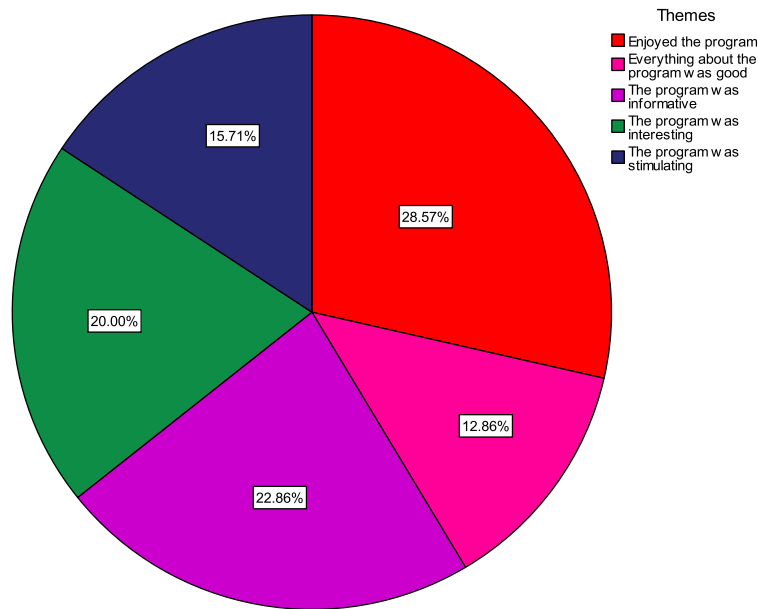
This may be due to the fact the DILP was designed, developed and adapted with both the generations' characteristics in mind. The following characteristics, which were identified in order to make the DILP applicable to Generation Y, could have resulted in their enjoyment of the program:

- Positive abilities with technology.

- Preference of non-linear interaction with information.

- Technology as motivation.

Generation Z's characteristics of learning coupled with entertainment in the form of visual and audio information, computer literacy, electronic multitasking and effortlessness with technology, could have resulted in their enjoyment of the program as well as their finding the program informative, interesting and stimulating.

6.6.2   Results for the question: How can the program be improved?

Figure 6.53: How can the program be improved?
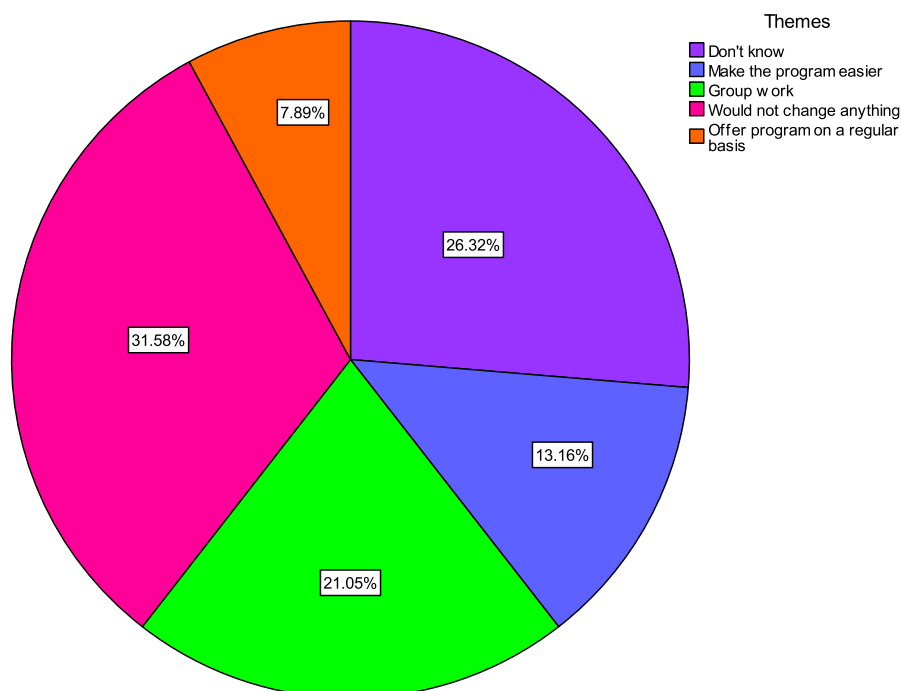
The analysis of the qualitative data showed that they would not change anything (32%). Once again, this may be due to the fact the DILP was designed, developed and adapted with the both generations' demographics and characteristics in mind.

Twenty-one percent (21%) of students indicated that a way to improve the program was to use group work.   This is consistent with the teamwork and peer learning characteristics of these generations.   Students from these generations are used to getting projects and assignments to complete as a group and therefore they prefer teamwork.   They are also used to being organised to get things done and being evaluated as a team.

Teamwork will also result in peer learning. Peer learning is important to them because they strongly identify with others in their age group.   Students from Generation Y generally rely on their peers to learn how to use a computer, educational programs such

as the DILP and various other computer applications.

The 26% of students who responded that they did not know how the program can be improved may have done so due to a lack of memory pertaining to the program as a whole. Thirteen percent (13%) of the students suggested that the program should be made easier. This can be done by changing some of the information in the various units of the DILP as was suggested throughout section 6.5.

Offering the program on a regular basis, as suggested by eight percent (8%) of the students, may enhance the students' lack of critical-thinking skills, their diverse academic skills and different information seeking behaviours.

6.6.3 Results for the question: Additional comments

Figure 6.54: Additional comments provided
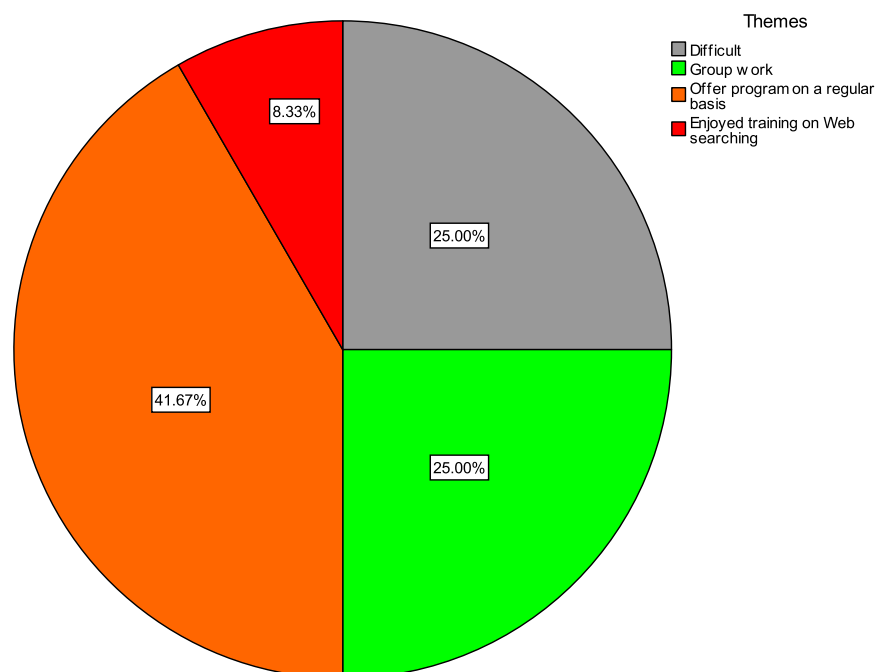
Additional comments derived from the follow-up interviews indicated that most of the students (42%) would like this program to be offered on a regular basis. This may be linked to the following characteristics: positivism, memorisation and wide range of experiences, as identified in Chapter 2.

By offering the program on a regular basis, students can redo the sections that they do not feel comfortable with, which will assist in memorising the content of the DILP. Their positive abilities with technology might encourage them to work through the program again and, by doing this, enhance their digital information literacy skills to widen their academic experiences.

Students from Generation Z also have a wide range of experiences with reference to computer literacy and academic preparedness or the lack thereof. By offering the DILP on a regular basis, students with a lack of computer literacy and academic preparedness will develop their digital information literacy skills.

Once again, a significant number of students (25%) commented on the issue of group work. As mentioned earlier, teamwork and peer learning are characteristics of these generations which should be taken into account when offering digital information literacy programs.

Twenty-five percent (25%) of the students responded that they found the program difficult. As suggested earlier, it would be useful to change some of the information in the units of the DILP as was suggested throughout section 6.5.

The following section will discuss the use of the paired-samples t-test to gauge the overall effectiveness of the DILP.

6.7   Judging the effectiveness of the DILP

The paired-samples t-test was used to gauge the overall effectiveness of the DILP. The mean test score for the pre-quiz was compared to the mean test score for the post-quiz, to determine whether students obtained a better average score in the post-quiz than in the pre-quiz, after working through the DILP. The mean test scores are indicated in Table 6.1.

Table 6.1: Mean total scores for pre- and post-quiz

	Mean	N	Std. Deviation	Std. Error Mean
Total score for post-quiz	19.03	486	5.296	.240
Total score for pre-quiz	18.47	486	5.148	.233

The mean total score for the post-quiz is then 19.03 and the mean total score for the pre-quiz is 18.47. The students therefore scored higher in the post-quiz after completing the DILP.

The following table indicates the paired-samples t-test calculation of the difference between the mean total score for the post-quiz and the mean total score for the pre-quiz as well as the statistical significance.

Table 6.2: Paired-samples t-test

| | Paired Differences | | | | | | | |
| | | | | 95% Confidence Interval of the Difference | | | | |
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	$p =$
Total score for post-quiz - Total score for pre-quiz	.558	4.381	.199	.167	.948	2.806	485	.005

The difference between the mean total score for the post-quiz and the mean total score for the pre-quiz is 0.558, which is statistically significant at the five percent (5%) level (p=0.005). It can therefore be concluded that the students obtained statistically significant better scores in the post-quiz than in the pre-quiz. The above-mentioned data is presented using an error bar chart (see Figure 6.55).

Figure 6.55: Error bar chart for paired samples
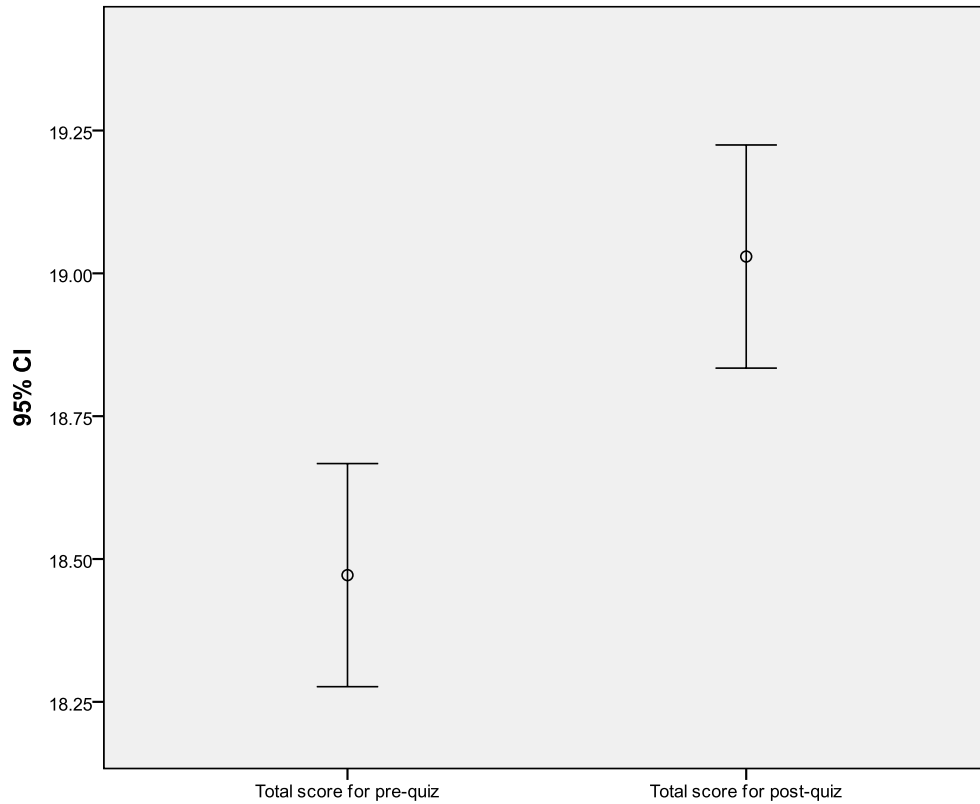
The error bars are interpreted as follows: the small circle in the middle of each error represents the mean of the test score for the pre-quiz (18.47) and post-quiz (19.03) respectively. The attached bars are the upper and lower limits for the 95% confidence interval on the mean. The lower bound for "Total score for post-quiz" is well above the upper bound for "Total score for pre-quiz" indicating the groups (pre-quiz and post-quiz). These are well separated and the difference is statistically significant.

The DILP was therefore effective in enhancing the digital information literacy skills of students since the _p_-value (_p_=0.005) is lower than 0.05, which is regarded as statistically significant.

6.8   Summary

This chapter discussed the quantitative and qualitative data analysis and gave interpretations of the data, as a means to make inferences about the DILP and outcomes assessment instrument, based on the sample data.   Descriptive statistics were used to provide summaries of the data for each of the questions in the pre- and post-quiz.

To detect changes in responses due to the experimental intervention in "before-and-after" designs, the chi-square of McNemar was used.   This aided the researcher in determining if the results were statistically significant or caused by chance. Furthermore, the McNemar test confirmed whether the results obtained can be attributed to the influence of the DILP.

In cases where the decrease was statistically significant, the results of the qualitative data were presented as a means to make further inferences about the DILP and the outcomes assessment instrument.   The interpretation of the qualitative data obtained from student feedback in the follow-up interviews for the three general questions pertaining to the program was also presented and interpreted.

The final step was to judge the overall effectiveness of the DILP. The paired-samples t-test compared the means of two variables for a single group, to determine if the difference between the means is statistically significant.   The difference between the means was statistically significant, indicating that the DILP was effective in enhancing the digital information literacy skills of students.

The next chapter, Chapter 7, will provide an overall summary of the study by referring to the major findings pertaining to each of the research objectives, which is followed by conclusions and recommendations. Suggestions for further research and a concluding comment will also be made.

Chapter 7

Summary, conclusions and recommendations

The primary purpose of this study was to evaluate the effectiveness of the DILP, in enhancing the digital information literacy skills of students belonging to Generation Y and Z. An outcomes assessment instrument was used and the DILP's worth as an educational program was judged.

This chapter will provide an overall summary of the study by presenting the findings for each of the research objectives. Conclusions are made by referring to the major research objectives and recommendations are made. The importance of this research to the field of study is highlighted and suggestions for further research are made, followed by a concluding comment.

7.1   Overall summary of the study

A detailed review of the South African student as member of Generation Y and Z was provided which focused on the demographics and characteristics of these generations. This was necessary in order to make the DILP applicable to and useful for both generations, since the DILP was originally designed and developed for Generation Y only and students from Generation Z are now also entering the academic libraries at institutions of higher education. Adaptations to the DILP were made to accommodate both generations.

It has become apparent that the students from Generation Y and Z are very connected, have ceaseless access to information and interact using social networking on a regular basis *via* their cellular phones and computers at laboratories on the campuses of higher education institutions. Although they spend a large amount of time online, students still have different levels of computer experience and some have a considerable lack of academic preparedness, resulting in ineffective search behaviours. Digital information

literacy programs such as the DILP should therefore be accessible *via* students' cellular phones and the Web sites of academic libraries. This will make digital information literacy programs useful tools to assist students with different levels of computer experience and lack of academic preparedness to become more digitally information literate.

New learning technologies such as multimedia Web sites, RSS, blogs, digital storytelling, online games, social networking and e-mail were identified and incorporated in the DILP, in an effort to make the DILP applicable to and useful for Generation Y and Z. The DILP explained to students these new learning technologies by using multimedia Web sites, such as YouTube.

Furthermore, new learning technologies can be used extensively in delivering digital information literacy programs to support the acquisition of digital information literacy skills by students. Programs such as the DILP can, for example, have their own Facebook page or blog. RSS feeds can keep students up to date by delivering new digital information literacy content using, for instance, Google Reader. Digital information literacy skills can be taught by using digital storytelling and online games which can be incorporated in digital information literacy programs.

A review of information literacy literature provided an outline of the evaluation initiatives of digital information literacy programs by academic libraries. This focused on the calls for evaluation of library instruction (ranging from bibliographic instruction and user education/instruction to information literacy and digital information literacy) and the actual evaluation that takes place, also ranging from bibliographic instruction and user education/instruction to information literacy and digital information literacy programs. A review of the evaluation of library instruction programs in enhancing digital information literacy skills of students, using outcomes assessment, was also provided.

It became evident that, although the literature provided some examples of the usage of outcomes assessment of student learning in terms of digital information literacy, nothing

has been reported in South Africa. The number of the evaluation initiatives using outcomes assessment tools written according to information literacy standards and outcomes as set by international bodies and associations dealing with information literacy, is scarce.

The number of outcomes assessment tools with proven validity and reliability is also negligible. No evaluation initiatives using outcomes assessment tools developed according to literacy standards and outcomes with proven validity and reliability could be traced in South Africa.

The evaluation of the DILP, using an outcomes assessment tool which was developed to map to international information literacy standards and outcomes, and the outcomes of the DILP itself, with proven validity and reliability, set a benchmark for academic libraries in South Africa.

The before-mentioned objectives provided a theoretical frame of reference for the study. This was done as the literature on information literacy provided no evidence of how programs such as the DILP could be made applicable and usable to its intended audience (in this instance, students from Generation Y and Z) by taking their unique characteristics and demographics into consideration and integrating new learning technologies with the program.

The analysis of reported research further showed the insufficient research done to evaluate digital information literacy programs such as the DILP by using an outcomes assessment tool which measures student learning in order to determine the effectiveness of the program. This led to setting the objective of developing a valid and reliable outcomes assessment tool, mapped to information literacy standards and outcomes.

The outcomes assessment instrument had to measure students' learning, while it showed evidence of validity and reliability and conformed to the benchmark of

information literacy standards and their set outcomes. The literature, once again, proved that such outcomes assessment instruments are scarce and the available ones cannot be used as a "one size fits all". An outcomes assessment instrument was therefore designed, based on the outcomes as set out in benchmarked information literacy standards such as those of the ACRL and CAUL, and validity and reliability were ensured by applying content validity and alternate-forms reliability.

After the outcomes assessment instrument was designed, with the before-mentioned aims achieved, it was administered in the quasi-experimental research phase in order to test the DILP. The collected quantitative data was then analysed in order to detect changes in responses due to the DILP. The chi-square of McNemar indicated statistical significance of the changes in responses. Nine questions in the post-quiz showed a negative change, which was statistically significant and follow-up interviews were conducted.

Telephonic and e-mail interviews were conducted for these nine questions. The qualitative data from student feedback was analysed and it was found that students mostly did not understand the questions or the options provided, or they felt that they needed more information/knowledge to answer the questions (knowledge acquisition).

In order to provide evidence of the overall effectiveness of the program, the paired-samples t-test was used. This test determined whether students obtained a better average score in the post-quiz than in the pre-quiz, after working through the DILP. In sum, the results indicated that students obtained statistically significant better scores in the post-quiz than in the pre-quiz and therefore it can be concluded that the DILP was effective in enhancing the digital information literacy skills of students.

Another part of this last objective was to indicate how the program could be improved to be even more effective in enhancing students' digital information literacy skills, for example by changing the content of some of the units, by allowing students to complete the program as a team and also by presenting the program on a regular basis. This will

be discussed in more detail in section 7.2.3, Evaluation of the effectiveness of the DILP.

The following section will provide the conclusions based on the major research objectives, with recommendations.

7.2 Conclusions and recommendations

Conclusions and recommendations will be presented by referring to the major research objectives as set out in Chapter 1.

7.2.1 Demographics and characteristics of Generation Y and Z

In Chapter 1, section 1.3.4, it was mentioned that one of the aims of this research study was to determine the effectiveness of the DILP by making it useful for and applicable to students from both Generation Y and Z, whilst taking their demographics and characteristics into account. As the DILP was originally designed and developed for Generation Y, it was adapted after identifying the demographics and characteristics of Generation Z.

The fact that the DILP was generally effective in enhancing students' digital information literacy skills, shows that there were tangential points with the students' characteristics, such as their positive abilities with technology, preference of non-linear interaction with information, technology as motivation, learning coupled with entertainment in the form of visual and audio information, computer literacy, electronic multitasking and effortlessness with technology, which were addressed in the adaptation.

The analysis of student feedback also proved that the DILP was adapted effectively, as the students found the DILP to be enjoyable, informative, interesting and stimulating. Students also suggested that the program should be undertaken in groups. This corresponds strongly with the teamwork and peer learning characteristics of these generations.

It therefore proves the significance of designing and developing, and also adapting current digital information literacy programs, such as the DILP, by taking the intended audience's characteristics and demographics into consideration.

Recommendations: Academic libraries at higher education institutions should attempt to design and develop their digital information literacy programs or web-based information literacy instruction programs, based on their audience's characteristics and demographics, to ensure the effectiveness of their programs. Academic libraries could also endeavour to establish which generations are using their library and adapt their current digital information literacy programs to address these generations' characteristics and demographics.

It would further be advisable for academic libraries to enable students to work through programs, such as the DILP, in a collaborative environment, where students can be divided into groups in laboratories and each group can work through the DILP whilst it is displayed *via* a data projector and also on monitors for each student. Discussions, activities and quizzes in the DILP can be completed in teams.

This is consistent with the teamwork and peer learning characteristics of these generations. Students from these generations are used to group projects and assignments and they prefer teamwork. Teamwork will furthermore result in peer learning. Peer learning is important to them because they strongly identify with others in their age group. Students from Generation Y generally rely on their peers to learn how to use a computer, educational programs such as the DILP and various other computer applications.

The qualitative data analysis showed that students felt that they did not gain sufficient knowledge and needed more information to answer some of the questions. They would also like the program to be presented on a regular basis. This will enable students to redo the sections they do not feel comfortable with, therefore assisting them to

memorise the content of the DILP. Generation Y has the characteristic of unwillingness to memorise, but their positive abilities with technology might encourage them to work through the program again.

Students at institutions of higher education – especially in South Africa – have a wide range of academic experience (or lack thereof), with specific reference to computer literacy and academic preparedness. Presentation of the DILP on a regular basis may assist those students who lack academic preparedness and computer literacy in assisting them to acquire digital information literacy skills.

The program could be presented on a regular basis

- at the start of every semester.

- during information literacy instruction sessions.

- weekly, and students who could not attend a specfic session due to class attendance or other activities can then attend the sessions they have missed when it is offered again.

- through the academic libraries' home pages on a 24-hour basis.

It is a well-known fact that these generations are the most electronically connected generations and, due to the fact that they use Web browsers, cellular phones, instant messenger services and wireless connections, are constantly connected to the Internet and their friends.

The above-mentioned permits them to communicate regardless of their physical location, to access a wealth of digital information and to author or contribute content to Web sites and weblogs. It is therefore important to emphasise the availability of digital information literacy programs or information literacy web-based instruction through academic libraries' home pages on a 24-hour basis.

Generation Z displays the characteristic of different information seeking behaviours. This was also proved during the testing of the DILP, as they demonstrated an inability to identify a well constructed search strategy. The literature also refers to their inability to search databases effectively. This is mainly due to the fact that they start off with Google searches and merely concentrate on the highest-ranked results on the first page. They are often unaware of databases.

The testing of the DILP furthermore indicated their lack of critical-thinking skills in, for instance, evaluating digital information literacy sources. Students were able to use the date criterion to evaluate a Web site, but not the authority and content criteria. When enhancing students' digital information literacy skills, libraries should pay extra attention to the construction of effective digital search strategies and evaluation of Web sources, by including innovative sections in their digital information literacy programs.

Digital storytelling is an innovative way to introduce digital search strategies and the evaluation of Web sources. This will be discussed in the next section.

7.2.2 Identification and incorporation of new learning technologies in the DILP

This research study also strove to determine the effectiveness of the program by incorporating new learning technologies in the DILP to make it useful to students from Generation Y and Z.

The identification and incorporation of new learning technologies such as multimedia Web sites, RSS, blogs, digital storytelling, online games, social networking and e-mail in the DILP, as discussed in Chapter 3, further allow for addressing Generation Y and Z's characteristics of using technology as motivation, visual orientation, electronic multitasking, constant communication and learning coupled with entertainment in the form of visual and audio information.

This proved to be effective especially in the section, Current awareness services, in Unit 7 of the DILP where RSS, blogs and Twitter are explained by means of multimedia Web sites, namely YouTube. Students proved their understanding of current awareness services by showing an improvement in the post-quiz.

To further incorporate new learning technologies in the DILP, Unit 7 links students to the DILP blog which contains digital information literacy aspects, such as multimedia on Boolean operators, to further enhance digital search strategies. There are also digital information literacy quizzes which should address the generations' preference for learning coupled with entertainment in the form of visual information. The DILP blog can be found at http://dilpstudent.blogspot.com.

Since the Web today is built around the concept of social networking, the DILP also has a page on Facebook. The fact that Generation Y and Z prefer constant communication means that they can now communicate and share information with friends on digital information literacy. The Facebook group can be found under DILP on Facebook or by using this URL: http://www.facebook.com/group.php?gid=134808366535728.

Recommendations: In 2011, new emerging learning technologies were identified which can also be included in the DILP. They are:

- Chat

- Web conferencing

- Mailing lists

- Interactive animations.

With chat, students and instructors can be connected online and they can converse by typing in text that is transmitted in real-time to the other person's computer screen. Instructors and students can communicate with one another (for instructional purposes or research assistance) whilst working through the program. This will further address the characteristic of constant communication of Generation Z and the importance of the

mentor characteristic of Generation Y.

Web conferencing makes the usage of audio and video possible. A group of people will be connected, while they are viewing the same program, such as the DILP, and can converse about certain issues arising from working through the program, in the same manner as people are using Skype or webinars today. This would be very suitable for the teamwork, peer learning, learning coupled with entertainment in the form of visual and audio information and constant communication characteristics of Generation Y and Z.

Libraries can use mailing lists to facilitate the distribution of digital information literacy course information, for example sending a unit of the DILP to students to work through. This can be done as a one-way communication tool, where instructions are sent to students enrolled to take part in the program or as a posting to all students enrolled at the institution of higher education.

Interactive animations are multimedia that can add an elaborate and engaging level of interactivity to a program. Libraries can use them to build simulations or create interactive activities to assist in teaching digital information literacy concepts. Flash and Shockwave are examples of interactive animations.

As mentioned in the recommendations in section 7.2.1, digital storytelling is an innovative way to introduce digital search strategies and other digital information literacy concepts and to evaluate Web sources. Digital storytelling is a short movie, containing the script of the subject to be introduced, images, video, music and narration and is about 2-10 minutes long. Academic libraries can use digital storytelling to introduce various digital information literacy concepts and include them in their online information literacy instructions.

Academic libraries should keep abreast with the latest learning technologies and digital devices to enhance students' learning experience and should also incorporate these in

the DILP, should the DILP be used.

If academic libraries ensure that their web-based instructions or digital information literacy programs are applicable to the students involved and new learning technologies are incorporated with such programs, the evaluation of programs should become important.

7.2.3 Evaluation of the effectiveness of the DILP

In Chapter 4, section 4.1, it was mentioned that the ACRL Institute for Information Literacy (2011) considers the evaluation of information literacy programs as one of the characteristics that illustrate best practice. A review of library literature however, reveals that comprehensive evaluation efforts are sparse.

Furthermore, the literature reported that insufficient research on the evaluation of the effectiveness of digital information literacy programs has been conducted in South Africa and abroad. Even more so, in terms of students' ability to demonstrate digital information literacy skills by using an outcomes assessment instrument with proven reliability and validity. All the above-mentioned factors contributed to the decision to evaluate the effectiveness of the DILP.

The DILP was evaluated by using a valid and reliable outcomes assessment instrument, where students had to complete a pre-quiz, work through the DILP and complete a post-quiz. After the data analysis and interpretation were completed, the following three categories of findings were identified with reference to the different units and sections of the DILP:

- The DILP made a noticeable positive change.

- The DILP made no noticeable change but is still proficient.

- There was a noticeable negative change.

Table 7.1 highlights each of these findings by indicating the unit number and section in the DILP, the change, and findings and recommendations.

Table 7.1: Units and sections of the DILP, the change, findings and recommendations

Unit	Section	Positive/not noticeable/negative change	Findings and recommendations
1	The need for information	Not noticeable	No improvement needed.
1	Define your topic	Not noticeable	No improvement needed.
1	Refine and limit a topic	Positive change	These specific sections in the DILP used a character named Sipho, who asked the students to help him to refine and limit a topic for an assignment. This addresses the peer learning characteristic of Generation Y and therefore the DILP enhanced this digital information literacy skill.
1	Explore general digital information sources	Negative change	Other sources such as online catalogues, Web search engines and UNIWIKI should also be included and explained in this section and not only the two general digital encyclopaedias, Encarta Encyclopaedia and Encyclopaedia Britannica, mentioned in this section of the DILP. This might improve the effectiveness of the DILP in enhancing the skill to understand that various general digital information sources should be explored to increase an understanding of assignment topics.
2	Selecting digital information sources	Not noticeable and also negative change	It was found that it is effective to use the same type of examples in the program and the outcomes assessment instrument. The journal example in the DILP is a medical journal just as the one used as an example in the post-quiz, which could have assisted the students in answering the question correctly, therefore enhancing the memorisation characteristic of Generation Y. The section on Digital encyclopaedias

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Unit	Section	Positive/not noticeable/negative change	Findings and recommendations
			explains when digital encyclopaedias should be used, for example looking for background information on a topic such as important persons, various cultures and countries. Using similar wording in outcomes assessment instruments and in the units of digital information literacy programs may enhance memorisation of information, as the information is repeated. This may help in addressing Generation Y's unwillingness to memorise. The digital magazine example used in the section, Magazines, is the Finance Week and is most likely to be unfamiliar to students and could be changed to a more familiar magazine title such as Drum.
2	Digital information access tools	Not noticeable	No improvement needed.
2	Search engines	Positive change	The section contains interactive exercises that are in line with various characteristics of the generations, such as learning coupled with entertainment in the form of visual information and also electronic multitasking, therefore making this section effective in enhancing the specific digital information literacy skill. Other "live" type of search engines could also be included in this section of the DILP and in the outcomes assessment instrument to further gauge students' understanding of the different "live" search engines.
2	Databases	Not noticeable	No improvement needed.
2	Constructing an effective digital search strategy: Boolean operators	Not noticeable	Although students did not do too well in either the pre- or the post-quiz in indicating their ability to identify a well-constructed search strategy, the literature does refer to their inability to search databases effectively. This is mainly due to the fact that they start off with Google searches and just concentrate on

Unit	Section	Positive/not noticeable/negative change	Findings and recommendations
			the highest-ranked results on the fist page – they seem unaware of databases. This is also linked to Generation Y and Z's characteristic of different information seeking behaviours. Academic libraries should therefore pay extra attention to enhance the digital information literacy skill of constructing effective digital search strategies by using efficient methods in their digital information literacy programs to teach students search strategies.
2	Constructing an effective digital search strategy: Phrase searching	Positive change	This section may have triggered the students' memory of how to construct a phrase search, as an example in the unit of the DILP was tourism management and it was also used in the pre-quiz as an example, therefore directed to the memorisation characteristic of Generation Y.
3	Criteria for evaluating digital information: Author	Not noticeable	No improvement needed.
3	Criteria for evaluating digital information: Content	Negative change	The unit may not elaborate enough on the importance of content evaluation and does not, for instance, discuss how reliable Web sites can be identified by looking at the URL in order to determine the type of site and location. The program only mentions that information should be from reliable Web sites such as university pages and the source should be judged in terms of popular or scholarly information. This section in the DILP can perhaps also explain in more detail the importance of looking at the quality of the pages in terms of the links, layout, fonts and graphics of the Web page and should not only mention that the information should be error-free, unbiased and trustworthy. Another reason why this unit may not have

Unit	Section	Positive/not noticeable/negative change	Findings and recommendations
			been so efficient can be linked to Generation Y's and Z's information seeking behaviour.
			Students normally just do a Google search and concentrate on the highest-ranked results on the first page supplied by a search engine, without even scrolling or looking at the content.
			This shows their inability to sometimes evaluate results and it also shows that they view all top results as being equal and worthy. It is therefore suggested that programs such as the DILP pay special attention to the evaluation of Web sites using content as a criterion.
3	Criteria for evaluating digital information: Date	Positive change	Once again, the same wording was used in the DILP and the post-quiz question which could have triggered the students' memory when they had to answer the post-quiz question.
			Repeating information may enhance memorisation, which is an identified characteristic of Generation Y.
4	Identifying digital information formats	Positive change	The section includes links for students to listen to various audio clips and humorous videos which address the characteristic of learning coupled with entertainment in the form of visual and audio information.
			The DILP was more effective in assisting students to identify digital information formats such as sounds, JPEG images, videos and movies than it was with GIF images. This may also be due to the fact that students are more familiar with JPEGs than with GIFs (a graphic format normally used on the Web, which includes features that enable animation).
4	Capture digital information	Not noticeable	No improvement needed.
4	Computer viruses	Not noticeable	No improvement needed.

Unit	Section	Positive/not noticeable/negative change	Findings and recommendations
4	Digital storytelling	Negative change	Perhaps students do not grasp the concept of digital storytelling as yet, as digital storytelling is not used widely in education in South Africa. It is, however, considered a powerful educational tool to use when introducing subjects to students. Digital storytelling can also be used as an assignment format. Instead of doing a written assignment in Word or PowerPoint, the assignment can be presented using digital storytelling. Digital storytelling was one of the new learning technologies which was integrated with the DILP.
5	Organise	Positive change	The section includes an interactive organising activity which enhances the students' skills of organising digital information.
5	Synthesise	Not noticeable	No improvement needed.
6	Free versus fee-based information	Not noticeable	No improvement needed.
6	Copyright	Not noticeable	No improvement needed.
6	Plagiarism	Not noticeable	No improvement needed.
6	Citation	Positive change	A citation is explained by making use of mouse overs to explain each part of a citation which may have enhanced the digital information literacy skill of students to identify a correct citation. It will be in line with the visual orientation characteristic of the generations.
6	Bibliographic reference style: Government publications and home pages	Not noticeable	No improvement needed.
6	Bibliographic reference style: Articles from journals/periodicals and digital books	Negative change	Students found it difficult to identify the bibliographic reference of an article from a digital journal/periodical as well as for a digital book. Students would probably find it more difficult to identify the bibliographic reference of a

Unit	Section	Positive/not noticeable/negative change	Findings and recommendations
			digital article as there are more fields involved in a bibliographic reference for an article from a digital journal/periodical than, for instance, that of a home page.
			Students may also not be too familiar with articles from digital journals, since the literature proved that students mostly use search engines such as Google to source information for assignments. This is in line with the characteristic of different information seeking behaviours.
			The DILP provides an example of a bibliographic reference for an article from a journal, with mouse overs which explain each field.
			The DILP's effectiveness in enhancing the skill of selecting or doing an appropriate bibliographic reference may be improved by including innovative methods such as interactive animations to explain bibliographic referencing.
7	Current awareness services	Positive change	The section was effective due to the incorporation of new learning technologies such as RSS, blogs and Twitter, illustrating what these are by means of educational videos from YouTube.
			This addressed the characteristics of visual orientation of Generation Y, the learning coupled with entertainment of Generation Z, and using technology as motivation for both the generations which improved the effectiveness of the DILP in enhancing students' current awareness skills.

Figure 7.1 will illustrate the most effective sections, sections where possible changes can be made and proficient sections in the DILP.

Figure 7.1: Most effective sections, sections where possible changes can be made and proficient sections in the DILP
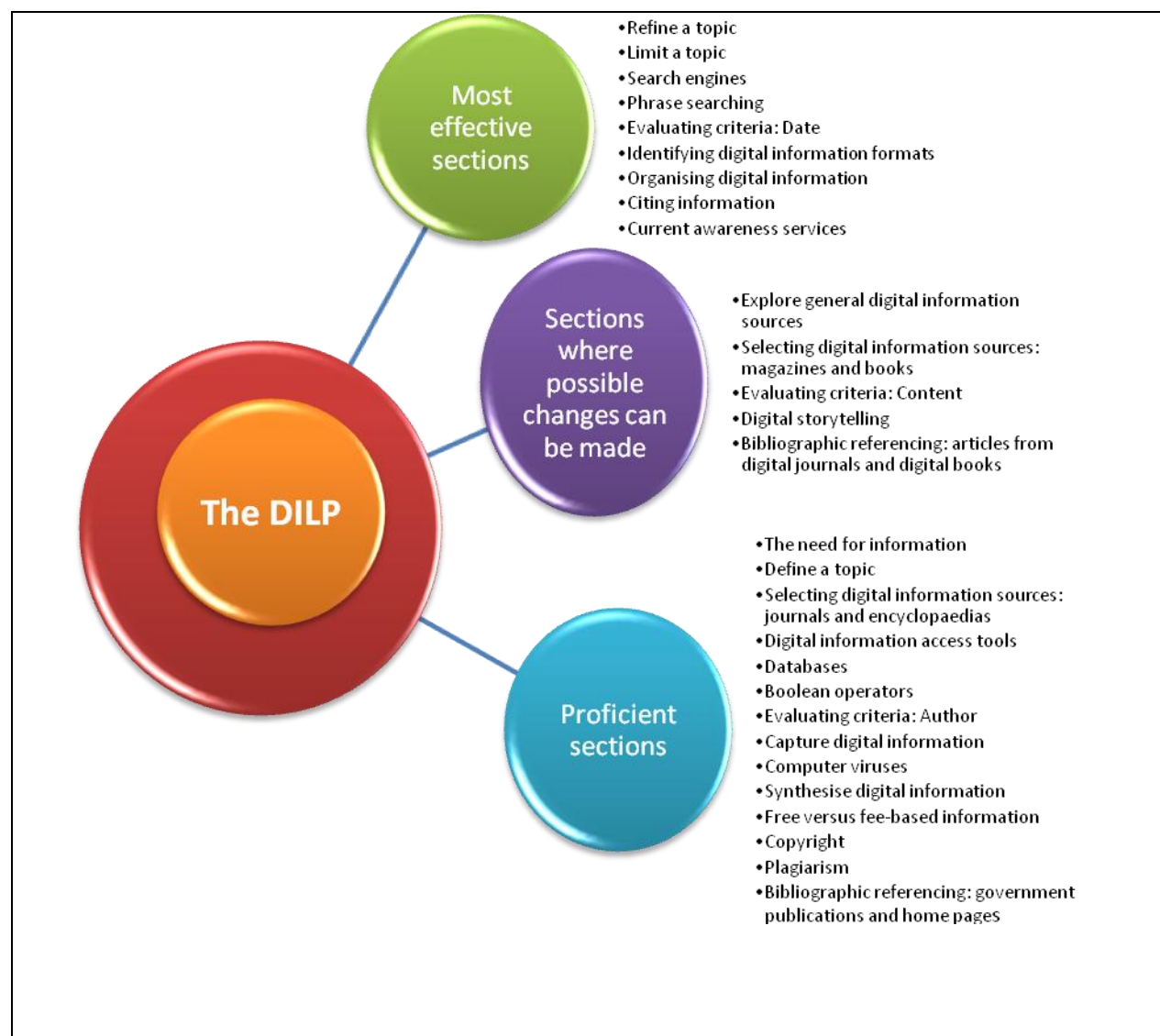
The evaluation proved that the DILP is effective in enhancing the digital information literacy skills of students. It can therefore be concluded that the DILP is considered an effective digital information literacy program and can be valuable as a web-based tutorial to enhance the digital information literacy skills of Generation Y and Z.

Further recommendations: Academic libraries should evaluate their digital information literacy programs or other web-based instructional programs which will allow

them to judge the effectiveness of the program and, by doing so, also judge its worth as an educational program.

7.2.4 Development of the outcomes assessment instrument

During the development of the outcomes assessment instrument, it became clear that, in general, the instruments previously used were merely standardised tests which only tested the skills of students and gave little indication of the real breadth of the assessment instrument or its validity and reliability. One of the aims of this study was thus to develop an outcomes assessment instrument with proven validity and reliability.

A basis for the construction of the outcomes assessment instrument was needed and it was decided to map the questions to the ACRL and CAUL standards and outcomes, since the outcomes of the DILP were written based on the information literacy competency standards of the ACRL and CAUL. For each outcome listed in the DILP, a question was constructed to address the outcome.

This allowed for the testing of content validity. Information literacy experts from South Africa and abroad were asked to determine whether the questions were truly mapped to the chosen ACRL and CAUL standards and their outcomes. Their suggestions were then incorporated in the outcomes assessment instrument (see Appendix C, Content validity of pre- and post-test for the evaluation of the Digital Information Literacy Program (DILP) with comments from information literacy experts and Appendix E, Mapping of questions to standards and outcomes with evidence of validity, based on expert ratings of the items).

The outcomes assessment instrument consisted of a pre- and post-quiz containing multiple-choice and matching questions as well as an open-ended question. The pre- and post-quiz differed but were equivalent in that they had the same number of questions, instructions, format and the same level of difficulty, which ensured alternate-forms reliability.

The pre- and post-quiz are therefore considered to be reliable, because similar results are obtained when they are repeated. They are also repeatable in the sense that academic libraries can use the instrument by altering the questions to map to the outcomes as listed in their web-based tutorials or digital information literacy programs.

During the testing of the DILP and the follow-up interviews, some findings, conclusions and recommendations were made with regard to some of the questions in the outcomes assessment instrument. These were the questions where the students failed to answer the post-test question correctly, but answered the pre-test question correctly or where some of the questions were testing the same skill. Eight questions were identified, namely Questions 2, 5, 6, 13, 14, 16, 17 and 19, which are presented in Table 7.2.

Table 7.2: Findings and conclusions and recommendations for questions in quizzes

Question in quizzes	Finding	Conclusion and recommendation
2	Follow-up interviews revealed that students did not understand the options provided	The sources mentioned in the mulitple-choices, namely an online catalogue and Web search engines were not explained in Unit 1. The students did therefore not understand the options provided. These should also be included in the specific section of the DILP. It was found that it is effective to use the same type of examples in the program and the quizzes, thus enhancing the memorisation characteristic of Generation Y.
5	Follow-up interviews revealed that students did not understand the option, UNIWIKI	UNIWIKI should be included and explained in the section, Explore general digital information sources of Unit 1, together with the two general digital encyclopaedias currently explained in the section. Students are aware of Wikipedia but not of UNIWIKI. To facilitate memorisation, the examples in the DILP

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Question in quizzes	Finding	Conclusion and recommendation
		and quizzes should correspond.
6	Follow-up interviews revealed that students found the layout confusing and did not understand the options provided	The grid format may appear to be too "lengthy" to the students and it might have taken the students too long to figure out how the question should be answered. This could be linked to the characteristics of Generation Y, namely their short attention span and the feeling of being overwhelmed. Questions like this should perhaps be avoided or constructed in a different manner in outcomes assessment instruments designed to gauge the effectiveness of programs, such as the DILP. Once again, it is clear that the same examples should be used in the program and the outcomes assessment instrument to facilitate memorisation. The journal example in the DILP is a medical journal, just as the one used in the post-quiz, which could have assisted the students in answering the question correctly, therefore enhancing the memorisation characteristic of Generation Y. Finance Week was used as an example of a digital magazine in the DILP, whereas Drum was used in the quiz, which could have caused the students to answer this question incorrectly.
13 & 14	Students did not experience problems with the questions but they are testing the same skill	Both questions 13 and 14 are testing students' ability to evaluate a digital information source by applying the authority criterion. These questions can be combined or one can be deleted, therefore also making the quiz a bit shorter.
16	Follow-up interviews revealed that the students did not understand the options provided	The options provided in the post-quiz were not discussed in detail in the specific unit of the DILP and memorisation could not be facilitated. It is therefore more effective to use the same examples in the program and the quizzes to enhance the memorisation

Question in quizzes	Finding	Conclusion and recommendation
		characteristic of Generation Y.
17	Follow-up interviews revealed that the students did not understand the options provided and students guessed the answer	The information in the speficic unit of the DILP does not correspond with the options provided in the post-quiz and memoristion could not be facilitated. During the construction of the pre- and post-quiz it was decided to provide four possible responses for selected-response questions such as the multiple-choice questions. This reduces the probability of a correct guess to 25%. Guessing can, however, not be entirely eliminated and students still mentioned that they guessed the answer. Questions 16 and 17 also seem to be testing the same skill, namely evaluating the content of Web pages and can be merged or only one of the questions could be included if the outcomes assessment instrument is considered for future use.
19	Although follow-up interviews did not reveal that the students did not understand the questions or the options provided, the considerable decrease in students' ability to answer the post-quiz was a concern.	It appears that the decrease occured as the distractors used in the pre-quiz were not believable, which could have helped the students to answer this question correctly. It is recommended that these distractors should be rephrased or changed if one considers using this outcomes assessment instrument again.

In summary, students found some of the questions, or the options provided, difficult or did not understand the question or the options provided. It is advisable that the options used in multiple-choice questions should also be discussed in the DILP to aid the memorisation characteristic of the generations. During the development of outcomes assessment instruments, one must ensure that different questions are not testing the same skill and multiple-choice questions in grid-like format should probably be avoided

as students may find the layout confusing.

Further recommendations: The use of alternative methods to evaluate the effectiveness of programs would be relevant and useful to investigate. Examples of these can be ePortfolios and simulations. With ePortfolios, the students can create a product or engage in activities, applying their new digital information literacy skills. The work is accumulated and stored over time to be reviewed to show their progress in acquiring digital information literacy skills.

Simulations can be used in a virtual environment which has the look and feel of the resource being studied. Set tasks, such as searching for digital information sources on a particular topic, can be given to students. The results can then be rated within the virtual environment. Simulations can be scripted to force students to make the right choice before being allowed to proceed with the next set task.

Once again, it would be important for these methods to show how validity and reliability were ensured as well as how these methods were mapped to information literacy standards as set out by different associations, such as the ACRL or CAUL.

Another recommendation for the outcomes assessment instrument would be to develop it as a web-based assessment tool built into the instruction, with online feedback to students and the evaluator. The questions in the quizzes in the various units of the DILP can be replaced with the questions of the pre-test. When the student answers a question, it provides immediate feedback and the student can proceed to the next question. Once the student has worked through the DILP, the post-test will also be given in a web-based environment. The results can be calculated immediately without having to mark the tests manually.

7.2.5 Testing of the DILP and administering of the outcomes assessment instrument

In general, it was found that students should be able to revisit the units of the DILP and redo the activities during the testing, to familiarise themselves again with the content if they did not understand the questions or options provided. They could then re-attempt to answer post-quiz questions.

Recommendation: It is recommended that the pre- and post-quiz (the outcomes assessment instrument) should be embedded in the program. This would reduce the time spent handing out and receiving the pre- and post-quizzes and also reduce photocopying costs. If the pre- and post-tests are embedded, the answers given by the students would also be automatically marked and counted, eliminating the effort of marking the quizzes by hand.

7.3   The importance of this research to the field of study

The value of this research is clear, as the literature indicated the paucity of the evaluation of the effectiveness of information literacy web-based tutorials, such as the DILP, which includes a meaningful assessment of student learning through outcomes assessment. There is no evidence of such evaluation undertaken in South Africa. The literature also indicated the lack of outcomes assessments which are based on benchmarked information literacy competency standards and their outcomes as well as outcomes assessment instruments designed with proven validity and reliability.

No indications could be found where programs such as the DILP were evaluated, while new learning technologies were incorporated in the program *and* it was designed, developed and adapted with its intended audience in mind.

This research study therefore fills the gap in this field of research, by determining the overall effectiveness of the program, as it

- incorporated new learning technologies in the DILP (informed by the demographics and characteristics of Generation Y and Z students), to make it useful to students from these generations.

- designed an outcomes assessment instrument based on the outcomes as set out in the benchmarked information literacy standards and outcomes of the ACRL and CAUL.

- ensured validity and reliability of the outcomes assessment instrument by applying content validity and alternate-forms reliability.

- carried out an outcomes assessment by measuring students' digital information literacy skills using the outcomes assessment instrument.

- proved that the DILP was effective in enhancing the digital information literacy skills of students, resulting in the fact that the DILP is viewed as an effective digital information literacy program that could be valuable as a web-based tutorial to enhance the digital information literacy skills of Generation Y and Z.

Academic libraries that cannot afford the luxury of a digital information literacy expert or training/instruction librarian can still offer their students access to digital information literacy programs by making the DILP available to students *via* the library's home page. Higher education institutions such as traditional universities, comprehensive universities and universities of technology which do not have comprehensive digital information literacy programs such as the DILP can also use the DILP to offer their students digital information literacy training.

A single research study, such as this, is by nature restricted to what can be accomplished in four years' time. An important result of this study is to present a set of ideas for further research, as it unearthed further questions.

7.4   Suggestions for further research

Based on this research, targets for additional research could be:

- The design and development of a digital information literacy program specifically for Generation Z or the "digital natives" and the evaluation thereof. This thesis showed an approach to the design, development and adaptation of a digital information literacy program for Generations Y and Z and the evaluation thereof. There are, however, opportunities for detailed research on a web-based tutorial for "digital natives".

- The development of alternative online outcomes assessment instruments for web-based tutorials with proven validity and reliability. This thesis indicated an approach for an outcomes assessment instrument, but there are more opportunities to develop alternative online outcomes assessment instruments.

- This thesis showed the results of integrating new learning technologies with the existing DILP. These results open the window for much more detailed research in the area of improving the integration of emerging learning technologies with web-based tutorials and the evaluation of their effectiveness.

7.5   Concluding comment

The ACRL (2010 & 2011) propounds in its *Guidelines for Instruction Programs in Academic Libraries* and *Characteristics of Information Literacy that Illustrate Best Practices: a Guideline: Best Practices Initiative*, the evaluation of instruction programs using direct measures such as assessing the overall effectiveness of programs by utilising appropriate evaluation methods such as summative evaluations.   The evaluation of digital information literacy programs should be an ongoing process aimed at understanding and improving instruction programs.

The DILP was thus evaluated, using an outcomes assessment, to prove its effectiveness as a digital information literacy program and can therefore be valuable as

a web-based tutorial to enhance the digital information literacy skills of Generation Y and Z.

"One of the great mistakes is to judge policies and *programs* by their intentions rather than their *results*" - Milton Friedman (1975).

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Appendix A

Design and development of the DILP

Introduction

Academic librarians realise that students cannot acquire the necessary digital information literacy skills without guidance and instruction. The overwhelming number of new e-databases, e-journals, e-monographs and other e-media makes it difficult for even subject specialists to stay abreast in their chosen fields (Bellard, 2005). Consequently, as mentioned in the Background of Chapter 1, a DILP was designed and developed for students, as part of the researcher's Magister Technologiae degree in Library and Information Studies.

This appendix will briefly report on the design and development of the DILP.

Design and development of the DILP

In order to develop a DILP, a qualitative research approach was used, where the research was 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 formed the foundation for the development of the program (Higson-Smith, Parle, Lange & Tothill, 2000:37). Reported research and literature were analysed to establish the following:

- A profile of students, as members of the so-called Generation Y (see Chapter 2, section 2.2 and 2.3)
- The criteria for model DILPs.

After these were determined, the DILP was developed to enhance digital information literacy skills of students. The following will therefore be discussed briefly:

- the criteria for model DILPs
- the content for the program

- organising the content of the program
- authoring
- applying navigation features
- the elements and principles of design
- evaluating and testing the DILP
- producing the DILP.

Criteria for model DILPs

To ensure the effective development of a model DILP, criteria for the development were identified. The most important criterion for a model DILP is that it should consist of various steps and activities and the DILP therefore consists of various steps and activities. The following figure depicts the steps and some of the activities in the steps (as used in the DILP) are then briefly mentioned.

Figure A.1:   Steps in a model DILP

Orientation enables the student to situate him/herself in the world of information (De Jager & Nassimbeni, 2002:4). During this step, the student, for instance, defines a topic and identifies keywords to be used in an information search.
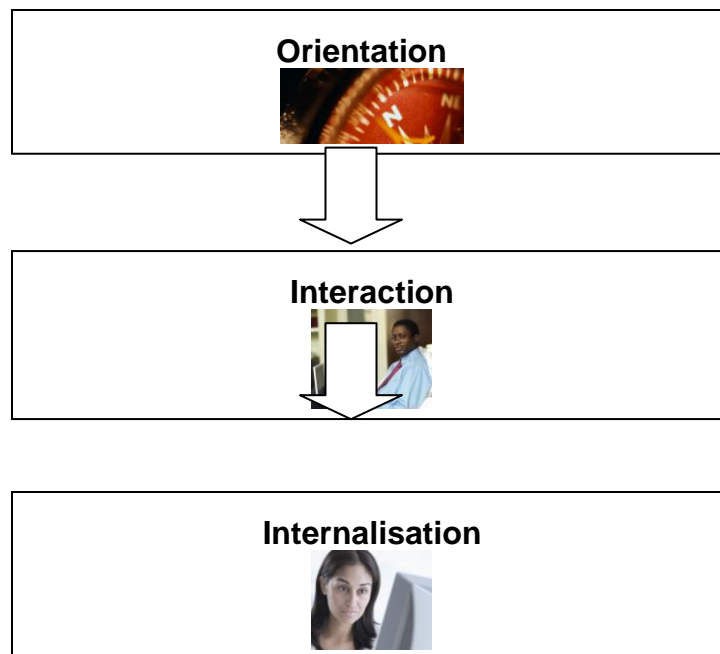
Interaction' is the continuous transfer of information in both directions between information sources (books, journals, *etcetera)* and the person (student) using it (Oxford advanced learner's dictionary of current English, 1995:621). The student can, for instance, search for information using a variety of digital information sources, for example full-text databases, electronic books and electronic encyclopaedias.

Internalisation is when the student makes the information part of himself/herself by, for example, producing, presenting and communicating an assignment. The DILP therefore assists students in the following ways to internalise:

- it shows the student how to write an assignment/research project by, for example, providing a document on assignment writing.
- it shows the student how to communicate the digital information by, for example, using e-mail, bulletin boards and online discussion groups.

Following the above-mentioned, the author had to decide on the content of the program, as will be expounded in the section below.

Deciding on the content of the DILP

The content of an online DILP should be grounded in information literacy standards (Lindsay, 2004). In 2000, the Association of College and Research Libraries (ACRL) produced the *Information literacy competency standards for higher education*, the Council of Australian University Librarians (CAUL) published the *Information literacy standards* in 2001, and the Society of College, National and University Libraries (SCONUL) produced *Learning outcomes and information literacy* in 2004.

These standards were therefore adapted while writing the content of the DILP. The seven standards and their outcomes are represented by the seven units of the DILP and can be seen in Table A.1.

Table A.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 information access tools for finding digital information. • construct and carry out an effective digital search strategy. • retrieve digital information in a variety of formats.	**Unit 2** **Searching for digital information**
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:	**Outcomes:**	**Unit 4**

Standard	Outcomes	Unit number and title
The program shows the student how to store and manipulate the digital information and describes various digital information formats.	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.	**Obtaining and managing your digital information**
Standard 5: The program shows the student how to create new knowledge by integrating digital information.	**Outcomes:** The student can • organise digital information. • synthesise the digital information found.	**Unit 5** **Organising 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 to recognise that lifelong learning requires digital information literacy.	**Outcomes:** The student can	**Unit 7** **Keeping up to date with digital**

Standard	Outcomes	Unit number and title
	• seek to maintain current awareness. • keep up to date with digital information sources and technologies.	**information sources**

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 therefore relates to the standard and had to include the recognition for 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 were then based on achieving the outcomes of the unit.

The content of the units relied on text-based material and multimedia elements. The textual content includes definitions, compact explanations and real-life examples (Hegarty, Quinlan & Lynch, 2004). 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 and tables, to enhance the reading process in Microsoft FrontPage. After deciding on the content of the DILP, the content had to be organised.

Organising the content of the DILP

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

An information map is a diagram that shows the overall structure of a program, making the program visible and indicating the flow from one Web page to another (Carliner, 2002:91). The prototype of the DILP was therefore 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 A.2 on the next page contains a section of the information map for the DILP.

Figure A.2:   A part of the information map for the DILP
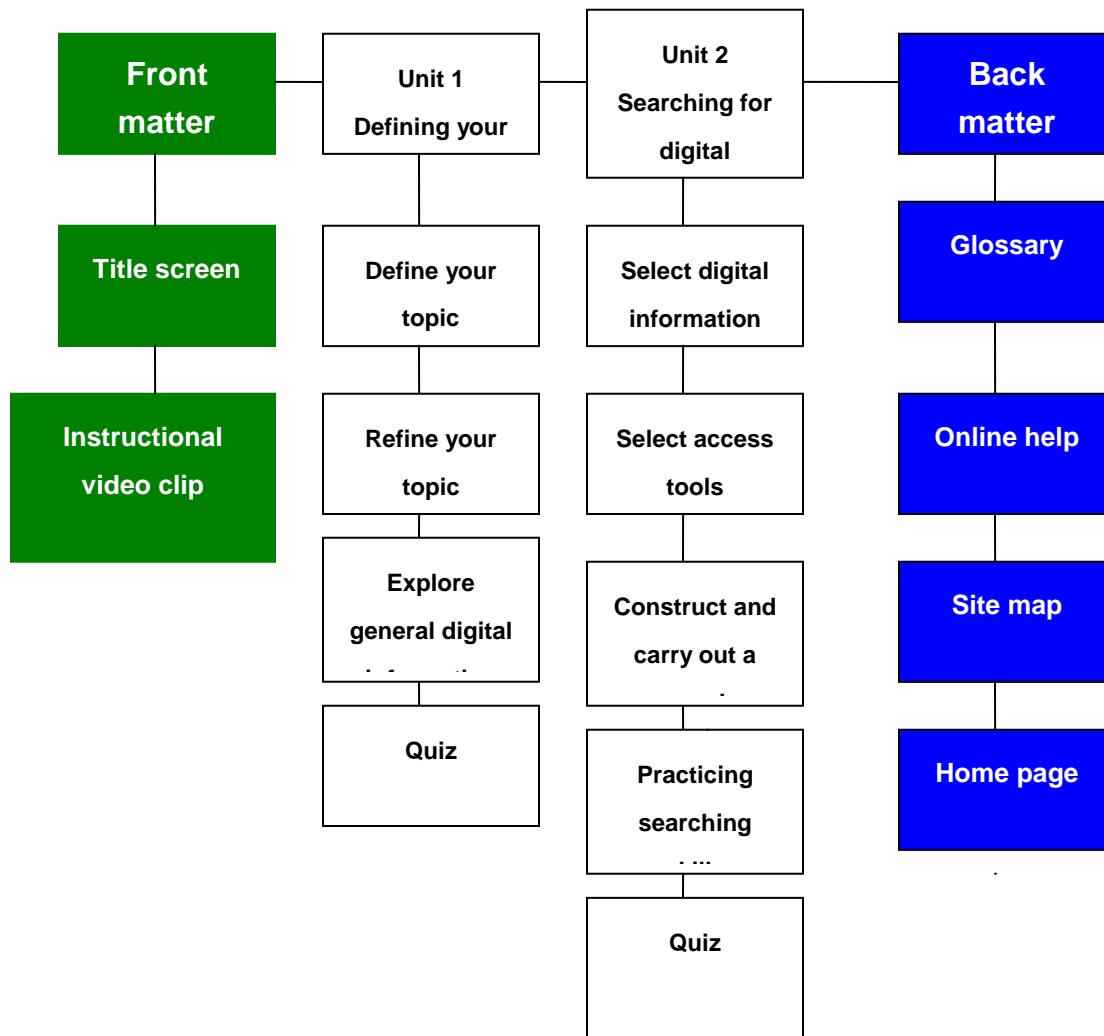
The page layouts were done by using storyboards. A storyboard, according to Carliner (2002:116), is a form on which the plans for a given screen are recorded.

Storyboards were prepared for each screen of the DILP, showing the visual details. 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 – should be given in the online DILP. Screen captures were inserted into the storyboards to assist the Web developer in showing him/her what the student should be able to see.

For each screen in the program, a storyboard was developed. It documented the objectives/outcomes and described the media that were used on the screen – text, graphics,

photographs, audio or video material or a combination. Correct and incorrect responses to questions were also documented. Hereafter, the Web developer authored the pages of the DILP using Microsoft FrontPage.

Figure A.3 contains an example of a storyboard that was used in the development of the DILP.

Figure A.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.

Following the organisation of the content, the content had to be authored using the appropriate software.

Authoring

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

The hardware used was 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, a 14" monitor, a CD drive, telecommunications consisting of a modem and telephone line, and 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 Microsoft 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 Microsoft FrontPage is that, when viewing Microsoft FrontPage html pages, they look exactly as they would appear in Microsoft Explorer, therefore simplifying the design of a Web site. Microsoft FrontPage is also more user-friendly and cheaper than some other Web authoring software, like Macromedia Dreamweaver.

Table A.2 contains a detailed list of the hardware and software used during the authoring process.

Table A.2:   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
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

The authoring process

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

Thereafter the logo, graphics, audiovisual components and Web page templates were added. Some of the graphics were redesigned as they displayed rather unattractively on the Web pages. 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 sub sites, a site map, online help, a glossary and a page containing the sources consulted.

After the third review, the final changes were made, for example correcting fonts that were still not in sans serif Arial and links that were inactive.

During the authoring process, navigation features, elements of design as well as the principles of design were applied. This was important since the development took place in a Web environment.

The DILP was developed in a Web environment, because usage of the Web has increased significantly over the last ten years and students are eager to utilise this medium. Some of these features, elements and principles, however, had to be changed due to their inefficiency – as experienced during the review process. These are highlighted in the following section.

Navigation features, elements and principles of design

The navigation features, elements and principles of design, which were applied during the development of the DILP, are discussed in the section below.

Navigation features

Navigation buttons and local navigation are both navigation features. Apart from text hyperlinks, navigation 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 (see Figure A.4):

- Indicate the various units (top)
- Link to the home page (top)
- Site map (bottom)

- Glossary (bottom)

- Help (bottom).

Figure A.4:   Navigational buttons
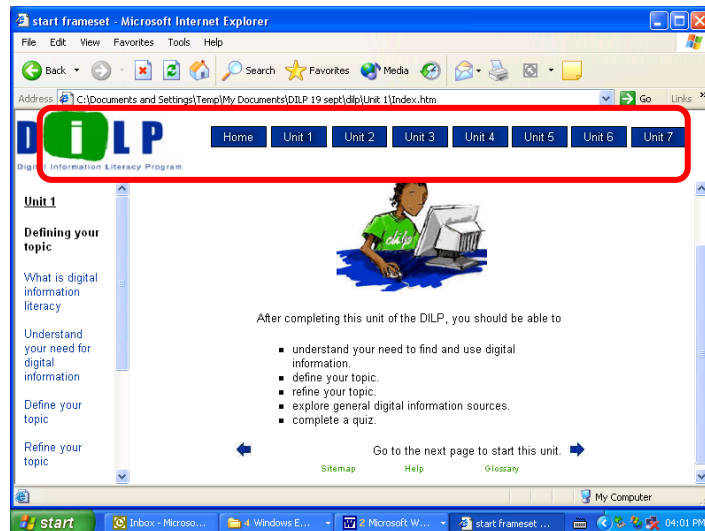
Local navigation

Backward and forward arrows were used as local navigation devices, to allow backward and forward navigation, as well as the option to click on the outlines in the left frame or BACK or FORWARD in the button bar. The local navigation is illustrated in Figure A.5.

Figure A.5:   Local navigation
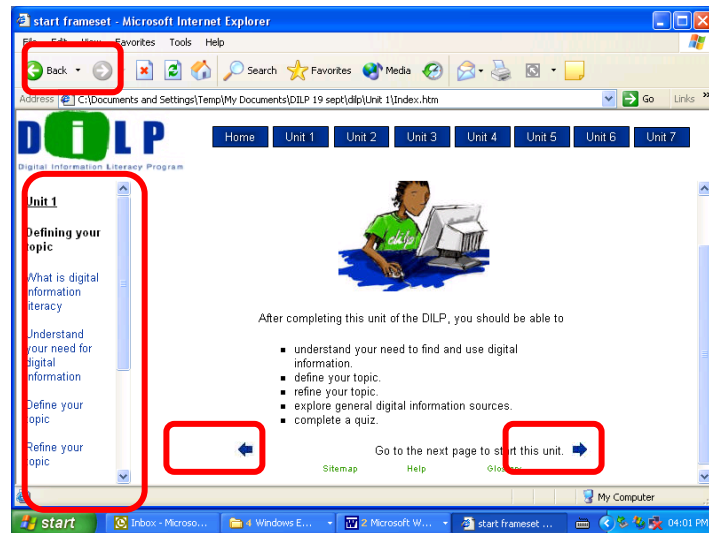
The following elements and principles of design were used:

- Colours and background
- Typography
- Site architecture
- Emphasis.

Colours and background

Web safe blue and green were chosen, as they appear consistent on any computer monitor or Web browser. Black was used for headings as it adds life to white background pages.

Typography

A 10-point type – instead of the 12-point type – was used for body text to make use of the limited space in the browser window. Instead of using underlined text to indicate hyperlinks, a blue colour was used for emphasis.

The following principles of design were changed after the review process:
- site architecture, and
- emphasis.

Site architecture

During the design process, it was originally decided to use the flexible approach 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 A.6).

Figure A.6:   Site architecture
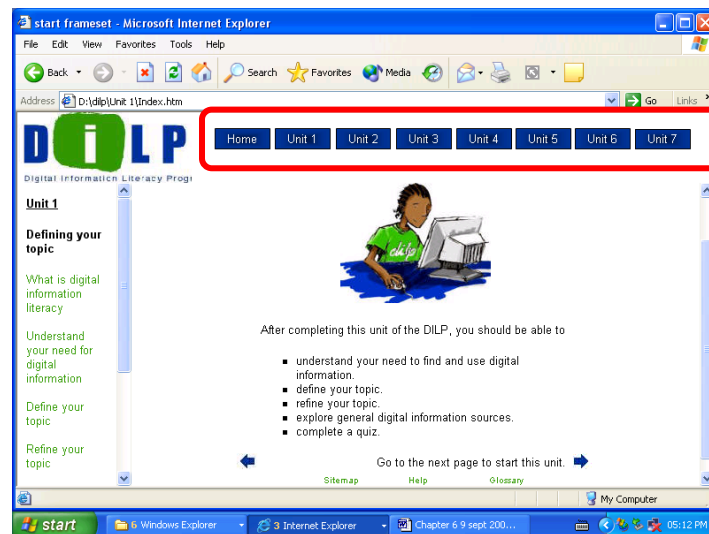
Emphasis

Apart from the headings and graphics that were used to place emphasis on something important, blue mouse overs were also used to explain certain terms, as illustrated in the Figure A.7.

Figure A.7:   Mouse overs for emphasis
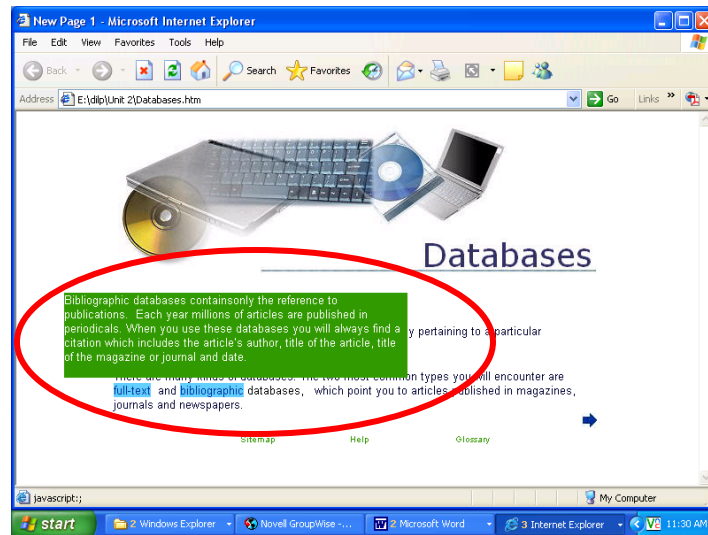
Another method of emphasis was used, namely message boxes for the answers to the quizzes. These are boxes that appear in Microsoft Windows with a default sound and text containing messages for the user (see Figure A.8). The default message boxes of Microsoft were used rather than customised ones, as it requires a lot of time and effort to redesign these message boxes.

Figure A.8:   Message box for emphasis
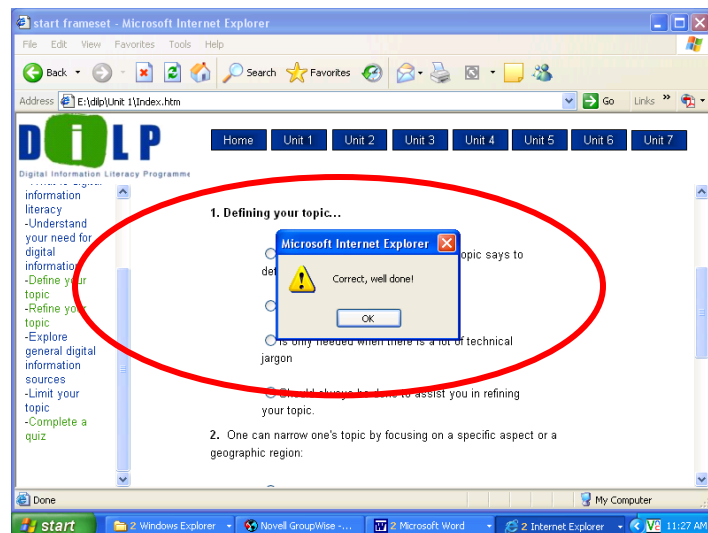
Following the development of the DILP, the prototype was evaluated and tested.

Evaluating 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 – the students – were given an evaluation form to complete after having worked through the DILP. The completion of the form was done anonymously. 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. Small incentives were offered to encourage participation in the evaluation of the DILP.

Only five students were used, as Nielsen (2000) states that the cost-benefit analysis of evaluation provides the optimal ratio with three or five users. By adding more users, one will not necessarily learn anything new, as the same responses will appear repeatedly.

Responses from students indicated that the average time taken to complete the program is one hour 36 minutes. A sample of other student responses is indicated below:

- "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 program is user-friendly."
- "The program is very informative."
- "The organisation of the units is very effective."
- "I don't think it needs any improvement cause [*sic*] it's fun and challenging and I enjoyed every moment."
- "The program was awesome, it does not need improvement, but I think more information on computer viruses will be necessary."

The following are responses from the students on what they liked about the program:

- "The highlighted words throughout the program, when you place pointer [*sic*] over the word, the meaning or short description pops up."
- "The quizzes at the end of each unit."
- "I liked learning about the different search engines available and also the quiz after each unit."
- "Every unit has its own title and objectives."

Table A.3 tabulates the interpretations of some of the other responses and actions taken to improve the DILP.

Table A.3:   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 presentation techniques were creative.	None of the presentation techniques were 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	It was decided not to alter any of the screens,

Responses and interpretations	Actions taken
visually pleasing.	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.

It was evident from the evaluation and testing that the students were satisfied with the program. It can therefore be concluded that the development of the program was successful.

Following the evaluation and testing of the program, the necessary changes were made to the DILP and the program was produced.

Producing the DILP

Before producing the DILP, it was re-tested. Once the testing was performed, the DILP was ready for production. A master copy was prepared and duplicated on a Web-published CD.

This CD can be used to post the DILP on an intranet, extranet or Internet site (Carliner, 2002:24). Further copies of the DILP were also produced on Web-published CDs. Related materials, such as the CD jackets, were also designed and duplicated.

Conclusion

This development of the DILP has made it possible to provide academic libraries at higher education institutions with a product – a DILP on a Web-published CD – that can be used as is, or adapted according to the students' specific needs or circumstances, in order to enhance their digital information literacy skills.

While the potential of the DILP is great, the following recommendation is made with regard to the DILP, namely that the DILP should be evaluated. Mouton (2001b:572) suggests that program evaluation – also called impact assessment or impact evaluation – should be carried out – which aims to establish the relative success or not of an intervention, such as the DILP.

Appendix B

Standards, outcomes and DILP specific outcomes

Figure B.1: Standard 1, outcomes and DILP specific outcomes

Standard 1:

Determine the nature and extent of the information needed

Defines and articulates the need for information

Defines or modifies the information need to achieve a manageable focus

Explores general information sources to increase familiarity with the topic

- Understand the need to find and use digital information
- Define a topic
- Refine a topic
- Explore general digital information sources

Figure B.2: Standard 2, outcomes and DILP specific outcomes

Standard 2:

Access needed information effectively and efficiently

Select appropriate information access tools for finding information

Select efficient and effective approaches for accessing the information needed

Search various search systems to retrieve information in a variety of formats

Identify keywords, synonyms and related terms for the information needed

Construct a search strategy using appropriate commands

Implement search strategy

- 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

Figure B.3: Standard 3, outcomes and DILP specific outcomes

Standard 3: Evaluate information and its sources critically and incorporate into knowledge base

Examine and compare information to evaluate reliability, validity, accuracy, authority, timeliness and point of view or bias

- Evaluate digital information sources and access tools
- Use the criteria
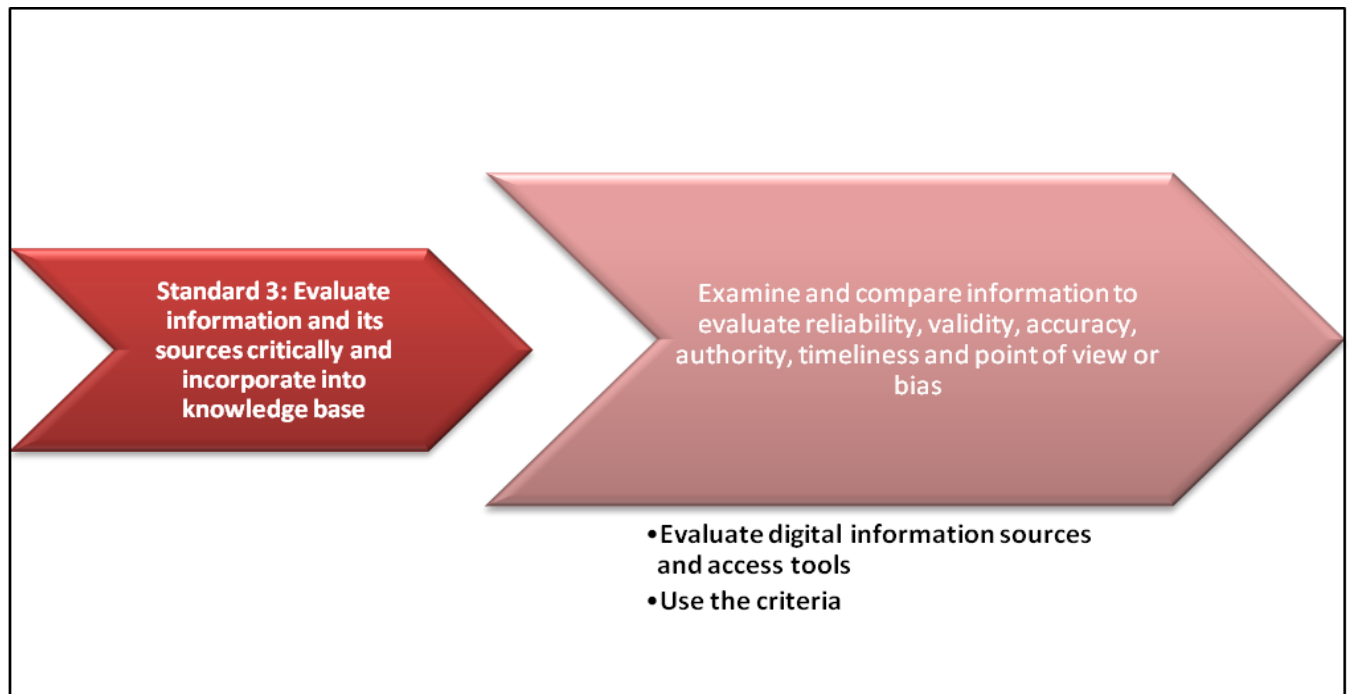
Figure B.4: Standard 4, outcomes and DILP specific outcomes

Standard 4: Classify, store, manipulate and redraft information collected or generated

Extract, record and manage the information and its sources

Manipulate digital text, images and data as needed, transferring them from their original locations and formats to a new context

Preserves the integrity of information resources, e.g. precautions agains computer viruses

- **Identify various digital information formats**
- **Create a system for organising the digital information**
- **Capture the digital information**
- **Take precautions to prevent spreading computer viruses**

Figure B.5: Standard 5, outcomes and DILP specific outcomes

Figure B.6: Standard 6, outcomes and DILP specific outcomes

Standard 6: Expand, reframe or create new knowledge by integrating prior knowledge and new understanding

Apply prior and new information to the planning and creation of a particular product, for example, organise the content

Synthesise main ideas to construct new concepts

- Organise digital information
- Synthesise digital information

Figure B.7: Standard 7, outcomes and DILP specific outcomes

Standard 7: Recognise that lifelong learning requires information literacy

Information literacy requires an ongoing involvement with information technologies, for example, seeking to maintain current awareness, keep up to date with information sources, information technologies and information access tools

- **Maintain current awareness by keeping up to date with digital information technologies**

Appendix C

Content validity of pre- and post-test for the evaluation of the Digital Information Literacy Program (DILP) with comments from information literacy experts

Letter to the literacy experts:

Dear Information Literacy Expert

The researcher is currently registered for her D.Litt et Phil (Information Science) at Unisa and would like to ask for your assistance in **determining the content validity** of the above-mentioned tests. The estimated time for doing this would be one hour and 30 minutes.

Background

As part of the researcher's Magister Technologiae degree in Library and Information Studies, a digital information literacy program, called DILP was designed and developed. A digital Information literacy program can be defined as a collection of instructions, *via* a computer, that will aid a student in identifying digital information which will address a particular information need in locating, effectively evaluating, organising and ethically using digital information formats.

The DILP was therefore designed and developed to enhance digital information literacy skills of students. Furthermore, the DILP was originally designed for students who are members of the so-called Generation Y, but members of Generation Z will also be entering universities and therefore also their libraries in the near future. These Generations have their own unique demographics and characteristics.

The demographics and characteristics of Generation Y were taken into consideration when the DILP was designed and developed. It was also important to identify the demographics and characteristics of Generation Z in order to incorporate this information in the existing DILP, making the DILP useful for both Generations.

The content of the DILP was grounded in information literacy standards. The standards used were:
- *Information literacy competency standards for higher education* produced by the Association of College and Research Libraries (ACRL) in 2000, and

- the *Information literacy standards* produced by the Council of Australian University Librarians (CAUL) in 2001.

Outcomes of the standards were applied in creating the content, exercises and quizzes for the program. The seven standards and their outcomes are represented by the seven units of the DILP.

The DILP is available in CD-ROM format and training librarians or information literacy lecturers can use the DILP for digital information literacy training sessions or students can improve their digital information literacy skills by working through the DILP on their own.

Programs such as the DILP have to be evaluated as the evaluation can be used to improve services or to validate a particular program as a learning tool (Stewart, Waight, Norwood & Ezell, 2004). An essential activity in the evaluation of library instructional programs is to assess the outcomes (Emmett & Emde, 2007:211). As mentioned earlier, the ACRL and CAUL outcomes were used in the design and development of the DILP and to assist in the design of the outcomes assessment instruments (the pre- and post-test), the standards and their outcomes were once again applied.

The design of the pre- and post-test therefore focused on mapping the questions to the ACRL and CAUL standards and outcomes. There are 20 outcomes which are set out in the different units of the DILP. The following figures illustrate how the questions were mapped to the outcomes (consisting of either an ACRL or CAUL standard, an outcome and DILP specific outcome and the pre- and post-test questions).

Instructions to Information Literacy Experts

Please study each figure and rate the extent to which the pre- and post-test question matches its purported outcome using one of the three rating categories: "Matched the outcome", "Uncertain" or "Did not match the outcome".

Please indicate in the table below each figure your rating for both the pre- and post-test. These indications will assist the researcher in determining whether the questions are truly mapped to the chosen ACRL and CAUL standards and their outcomes, therefore ensuring content validity of the tests.

Any additional comments and/or recommendations are welcome.

Comments by Ada Emmett and Judith Emde (University of Kansas) and Elsa Esterhuizen (Tshwane University of Technology)

Question 1
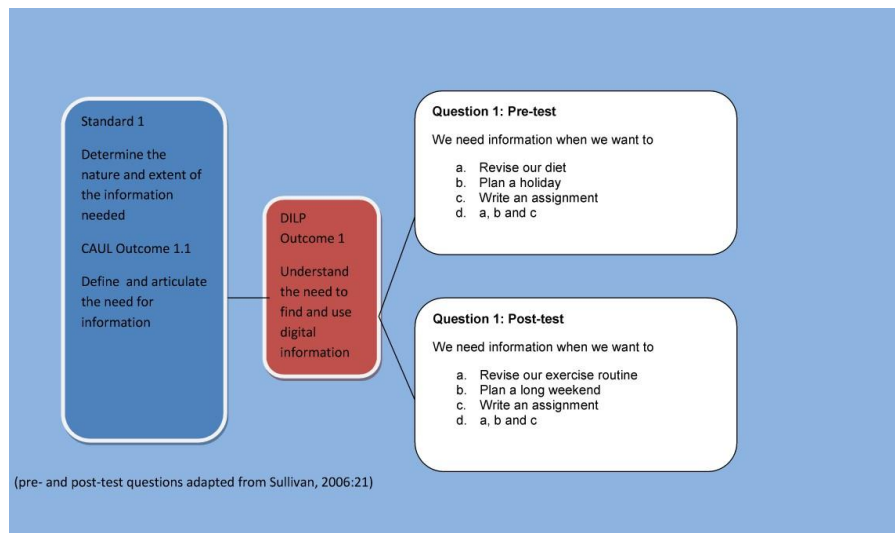
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	Yes		
Post-test	Yes		

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		
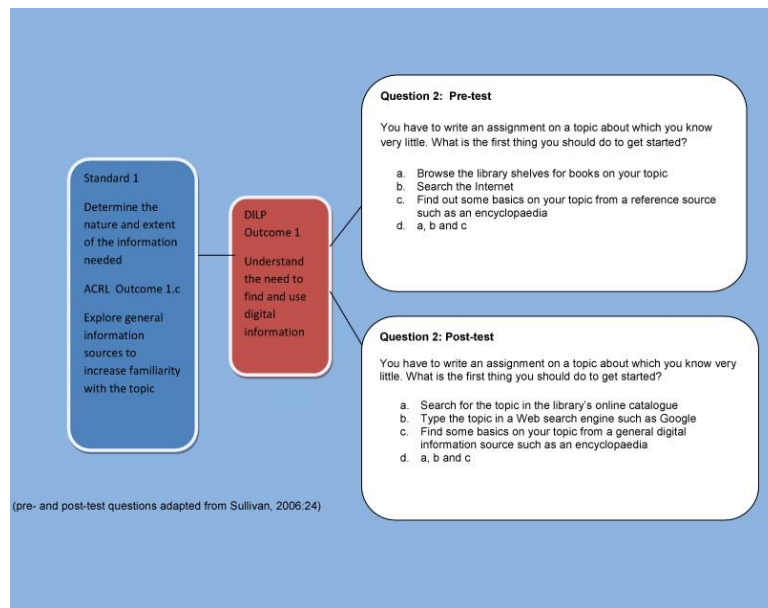
Question 2

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test		x	
Post-test		x	

Comments (E&E): If this is purely about digital information we are unsure why in question 2-pre-test you have listed the option for browsing the library stacks (not that it isn't a starting place but it is not a digital information source). We are uncomfortable with the phrase, "What is the first thing you *should* do to get started?" We aren't sure whether this is indicating that there is only one thing that is acceptable to do. (We both feel that answer d) is the right answer for both. Is that right?)

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test		√	
Post-test	√		

Comments (E): If emphasis is on digital information, the options in pre-test takes the attention away from the issue, since two responses refer to traditional/printed information sources

Question 3
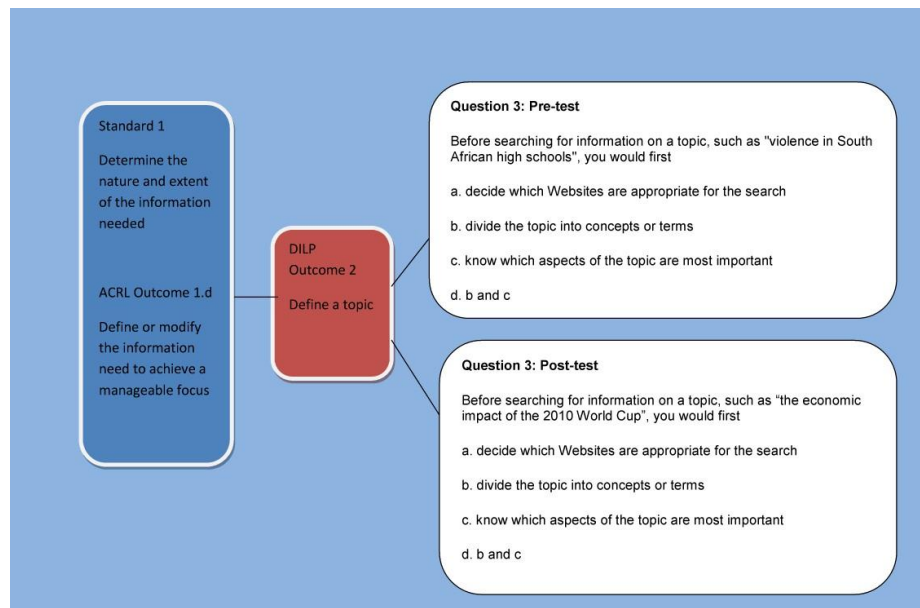
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		
Post-test	x		

Comments (E&E): We aren't comfortable with the use of "define a topic" as the outcome for your DILP. "Defining a topic" isn't the modification of the topic to a manageable focus. It is the starting point, at least as we are understanding this process. Perhaps "define a manageable topic" or "refine a topic" or "define a focused topic" would more closely match with the ACRL outcome. We are also presuming that answer d) is the correct answer.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Comments: somewhere I would have liked to see reference to the purpose issue: why is the student searching for specific materials, and do the purposes of the retrieved information match his/her purpose? Unless I missed it being mentioned in one of the other questions

Question 4
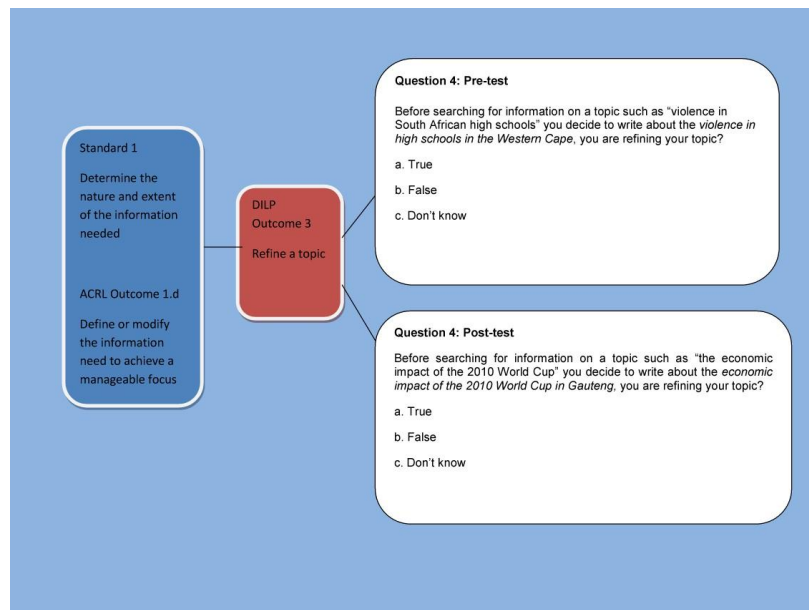
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test			x
Post-test			x

Comments (E&E): Perhaps you could present a topic and through a multiple choice set of answers allow the students to demonstrate an understanding of what a narrower or broader topic is (and therefore their ability to refine or focus their own topic): So it might be asked: "which of these provide a narrower version of the following topic: The economic of the 2010 World Cup"? a) economic impact of the 2010 world cup in Gauteng? B) the economics of the last 20 years of the world cup. C) the economics of foot ball.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 5
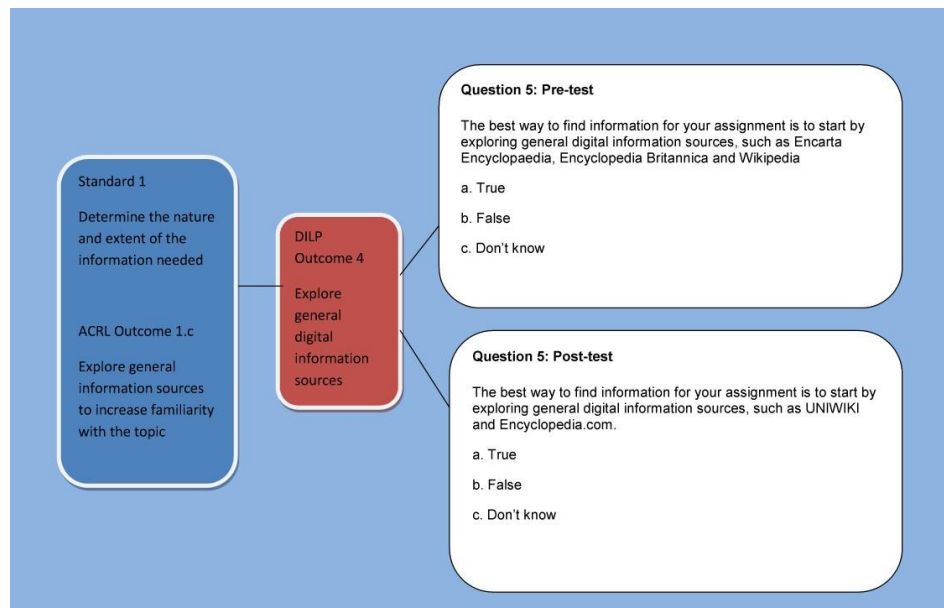
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		
Post-test	x		

Comments (E&E): We are under the impression that the answer is "true". Perhaps consider a means of asking this same type of question with multiple choice rather than true or false.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test		√	
Post-test	√		

Comments (E): Will it be wrong for students to refer to Google or any other general search engine when they have to indicate which sources they would like to explore in the beginning? I assume that for the post test they would have learned exactly what is being referred to

Question 6 (pre-test)

Question 6: Pre-test

For each information category on the left, circle the **number** of the ONE best source to use to find the information:

Digital source→ Information↓	Magazine (e.g. Drum)	Journal (e.g. Journal of Medical Research)	Book (e.g. Anatomy of the Human Body)	Encyclopaedia (e.g. Wikipedia)	Don't know
a. Current research on HIV/AIDS	1	2	3	4	5
b. Fashion, diet tips and celebrity information	1	2	3	4	5
c. Description of the Ndebele tribe	1	2	3	4	5
d. Detailed information about the humerus (arm bone)	1	2	3	4	5

(pre-test question adapted from UCLA Library, 2001)

Standard 2

Access needed information effectively and efficiently

CAUL Outcome 2.1

Select the most appropriate investigative methods or information access tools for finding the needed information

DILP Outcome 5

Select the most appropriate digital information sources for finding the needed digital information

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		

Question 6 (post-test)

Question 6: Post-test

For each information category on the left, circle the **number** of the ONE best source to use to find the information:

Digital source→ Information↓	Magazine (e.g. Drum)	Journal (e.g. Journal of Medical Research)	Book (e.g. Anatomy of the Human Body)	Encyclopaedia (e.g. Wikipedia)	Don't know
a. Current research on TB (Tuberculosis)	1	2	3	4	5
b. Exercise and lifestyle tips as well as TV programs	1	2	3	4	5
c. Description of the Tswana tribe	1	2	3	4	5
d. Detailed information about the femur (thigh bone)	1	2	3	4	5

(post-test question adapted from UCLA Library, 2001)

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Post-test	x		

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Post-test	√		

Question 7

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test			x
Post-test			x

Comments (E&E): We don't feel that this question offers a selection to choose from for "finding digital information" your question only provides one option (albeit to one they can confirm or deny its relevance).

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 8
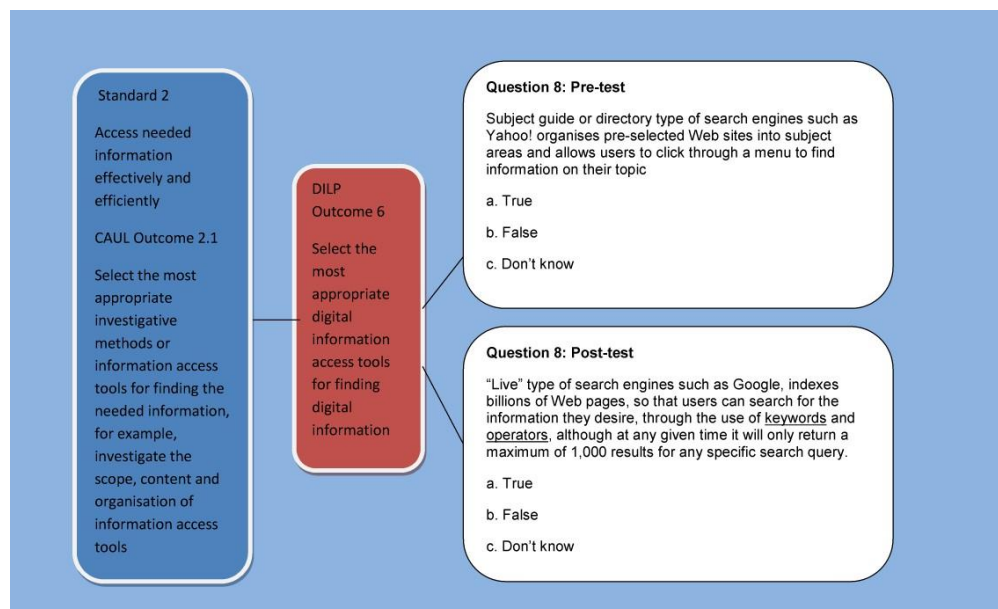
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test			x
Post-test			x

Comments (E&E): We can assume that you are trying to test their understanding of what a

given source might provide in terms of appropriate information, but we are partial to providing the student with an example of an information need and supplying them, if necessary through multiple choice a series of options and asking them "which is most appropriate?"   So, you might either change your DILP outcome, or, if you keep it as it is, consider our suggested changes to the question given to the student.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test		√	

Comments: The wording of the post-test question isn't quite clear to me – maybe the sentence is a bit too long?

Question 9
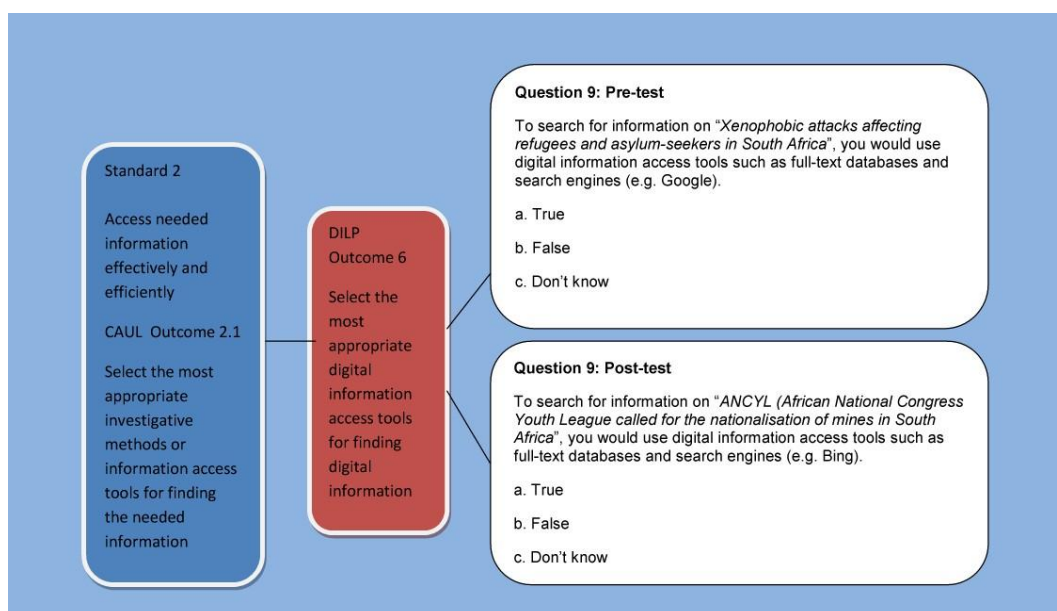
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test			x
Post-test			x

Comments (E&E): We aren't sure whether there is an obvious choice to students other than

"true" since full-text databases and search engines (if necessary) would be appropriate places for this kind of question. We don't think that the question posed here meets the outcome of your DIPL.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 10
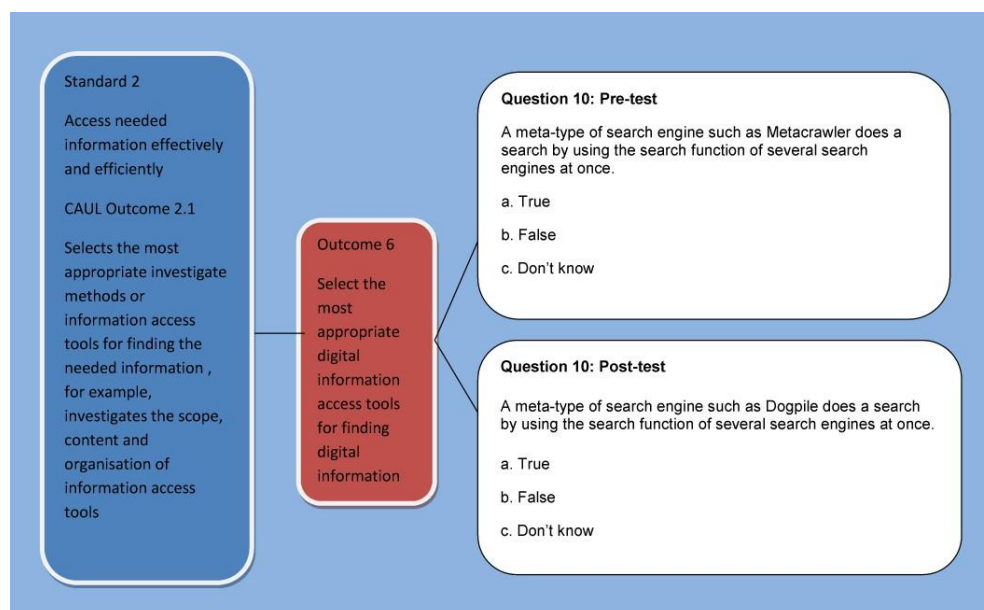
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test			x
Post-test			x

Comments (E&E): We can see that this question (as the others) attempts to gauge the students' understanding of what a given information source provides—and thereby will allow them to decide whether it is a most appropriate source to use but we aren't sure this is the most direct way to meeting the outcome. The true/false response is limiting as well.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 11

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		
Post-test	x		

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 12

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		
Post-test	x		

Comments (E&E): We think there is a typo in the second sentence of each of the questions. We also think it might be reworded to: "Circle the one you think is the best search strategy to start with." And in the post test, if b) is the intended answer we feel that there would need to be parentheses around the asthma OR hay fever to read: b) (asthma OR hay fever) AND characteristics.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 13
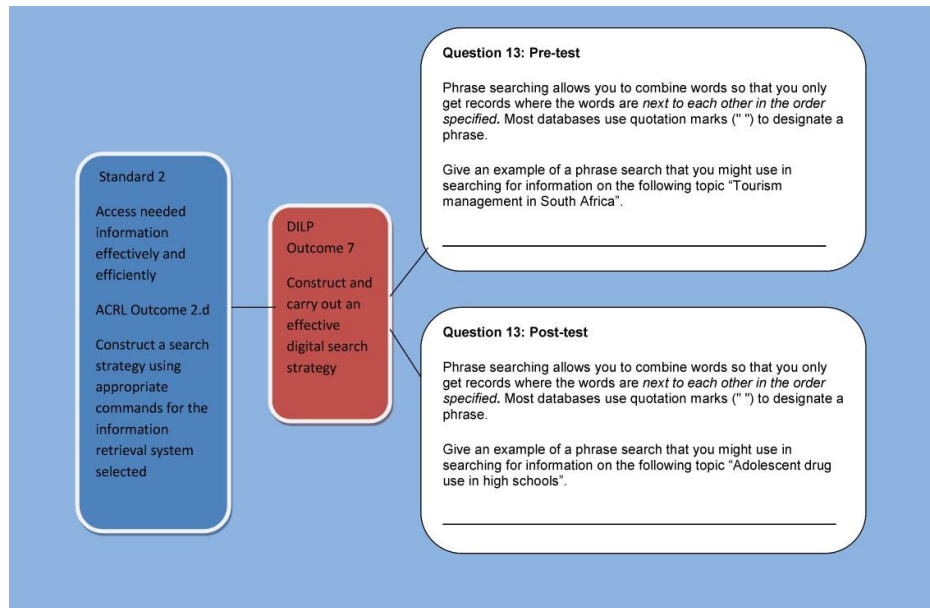
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		
Post-test	x		

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test		√	
Post-test		√	

Comments (E): I'm a bit confused here: does electronic databases also provide for "…" searching?

Question 14

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		
Post-test	x		

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 15
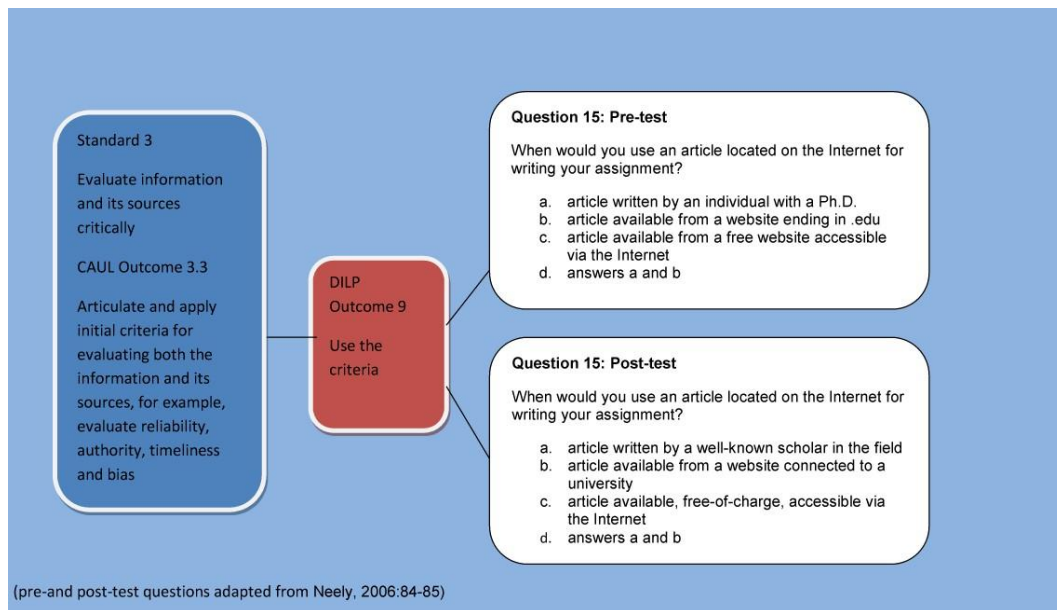
(pre-and post-test questions adapted from Neely, 2006:84-85)

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test		x	
Post-test		x	

Comments (E&E): We are not sure what is meant by "use the criteria". Do you mean the "evaluation of reliability, authority, timeliness and bias" criteria? We assume the answer is a) or d). That said, c) seems to be a broader option and very well could include content from a) and b).

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 16
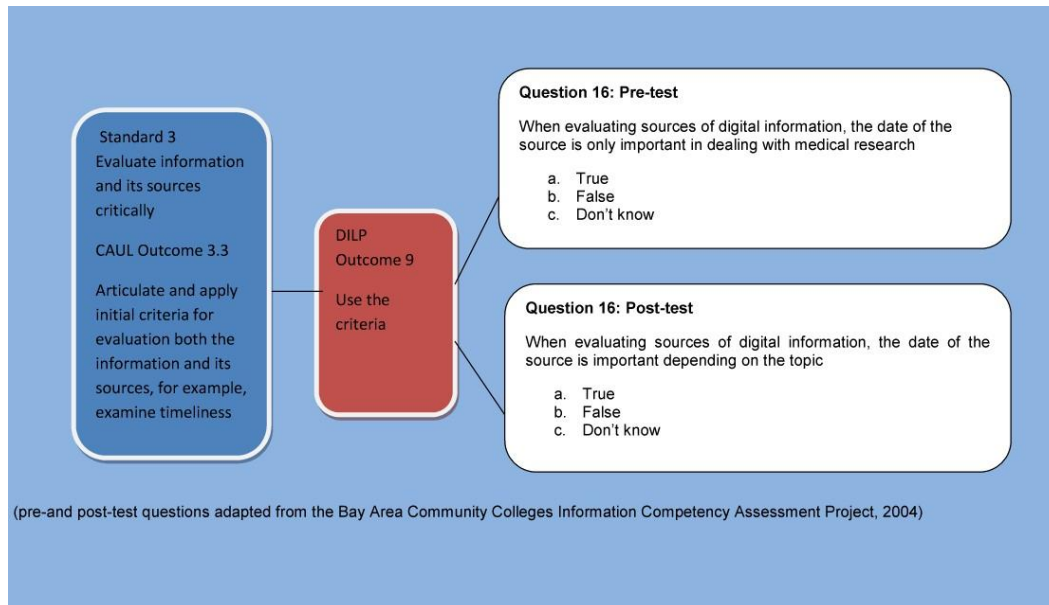
(pre-and post-test questions adapted from the Bay Area Community Colleges Information Competency Assessment Project, 2004)

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		
Post-test	x		

Comments (E&E): same as previous question regarding "use the criteria" (see our comment in question 15). We are guessing that the answer to the pre-test above is false and to the post-test is true, although "timeliness" can be determined in a variety of ways, i.e. when a site was last updated, when the information was authored/created.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 17

Standard 3

Evaluate information and its sources critically

CAUL Outcome 3.3

Articulate and apply initial criteria for evaluating both the information and its sources, for example, evaluate reliability, authority, timeliness and bias

DILP Outcome 9

Use the criteria

Question 17: Pre-test

If you find a web page, what would be your best clue as to whether the page is a reliable source to use in writing your assignment?

a. finding out which institution is hosting the Web page

b. date of the last update of the page

c. the quality of the page's graphic design

d. a, b and c

Question 17: Post-test

If you find a web page, what would be your best clue as to whether the page is a reliable source to use in writing your assignment?

a. the URL (http://www.......................)

b. the links the page has

c. the advertisements posted on the page

d. the layout, font and pictures used on the Web page

(pre-and post test questions adapted from Neely, 2006:90 and Bay Area Community Colleges Information Competency Assessment Project, 2004)

Emmette & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	Yes, but see below.		
Post-test	Yes, but see below.		

Comments (E&E): (see our comment in question 15). In the pre-test we are pretty sure that the intended answer is d) although we are less convinced that answer c) can provide clues to the reliability of the page. (Although we agree that it could provide clues). And in your post-test question, we are not sure whether the intended answer is a) as in a domain name as an indication of reliability/authority/bias or d) for the layout as being an indicator of authority (??).

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test		√	

Comments (E): Post-test: I'm uncertain about the options

Question 18
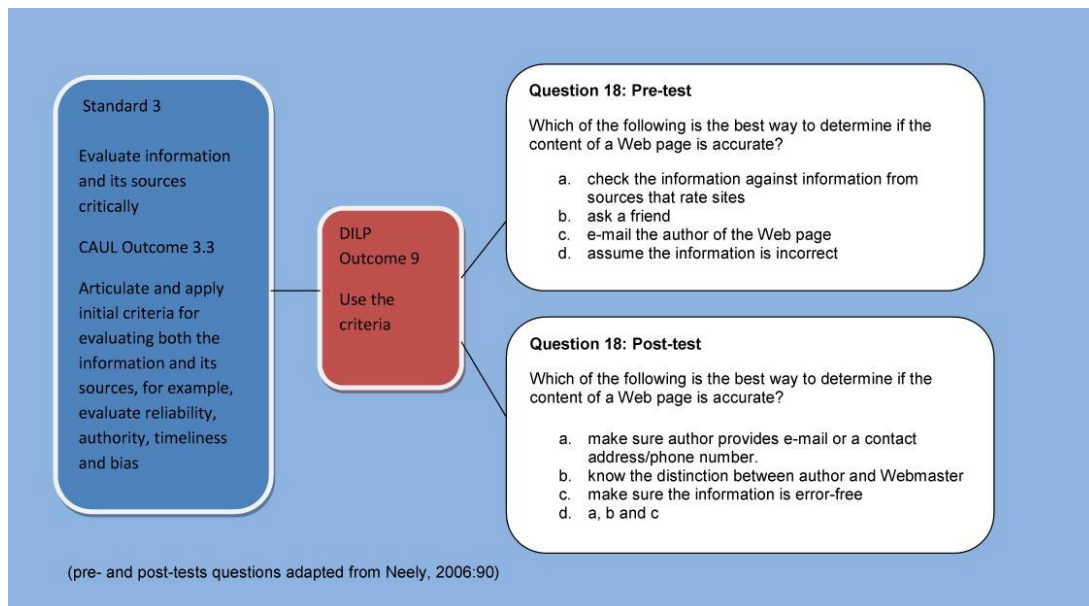
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	Yes, but see below		
Post-test	Yes, but see below		

Comments (E&E): (see our comment in question 15) We feel—as in question 17 that the questions you ask do match the outcome, but are uncertain about the options you choose. Perhaps this is due to the kind of information literacy training you do. In the pre- and post-test we are not sure what answer you believe is the correct one. For example, we would not consider writing an author as a method to determine a Web site's accuracy and we are rather unfamiliar with the idea of checking sources that rate the accuracy of other Web sites. Again, perhaps this is a different kind of information literacy training with which we are less familiar.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 19
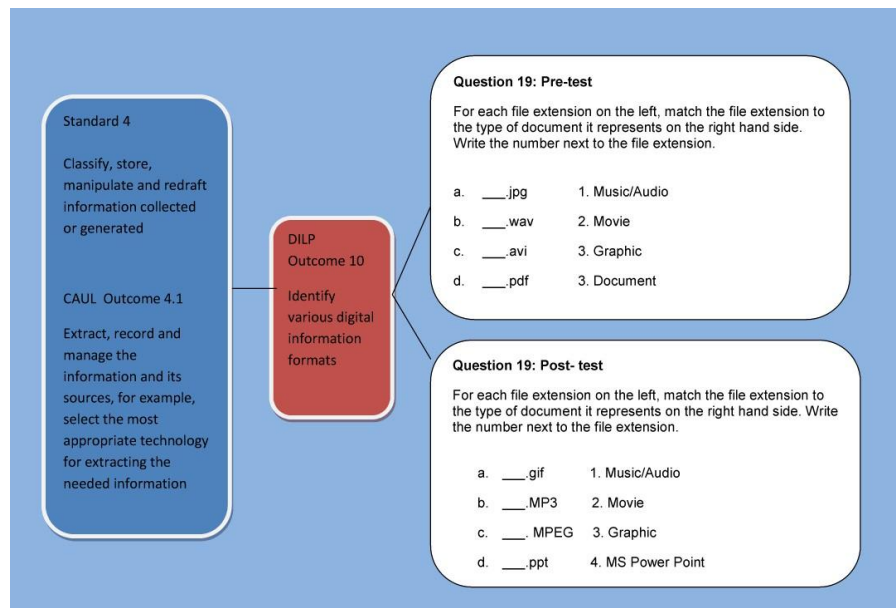
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test			X the CAUL outcome
Post-test			X the CAUL outcome

Comments (E&E): Taking a look at questions 19 and 20—we think that the CAUL Outcome 4.1 in question 19 is better matched to your DILP Outcome in question 20. For this question 19 we think your ACRL Outcome 1.d is better suited to your DILP Outcome 10 here. (So you would keep your pre-post questions as mapped to your DILP outcomes for both Questions, but swap out the Outcomes for questions 19 and 20.)

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 20
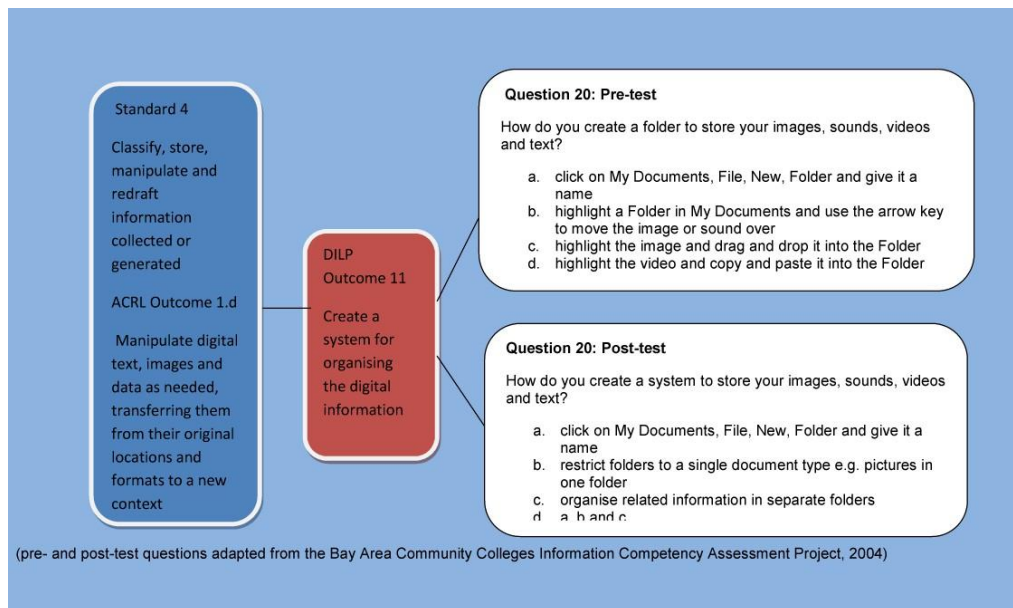
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test			X the ACRL outcome
Post-test			X the ACRL outcome

Comments (E&E): See above comments in question 19.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 21
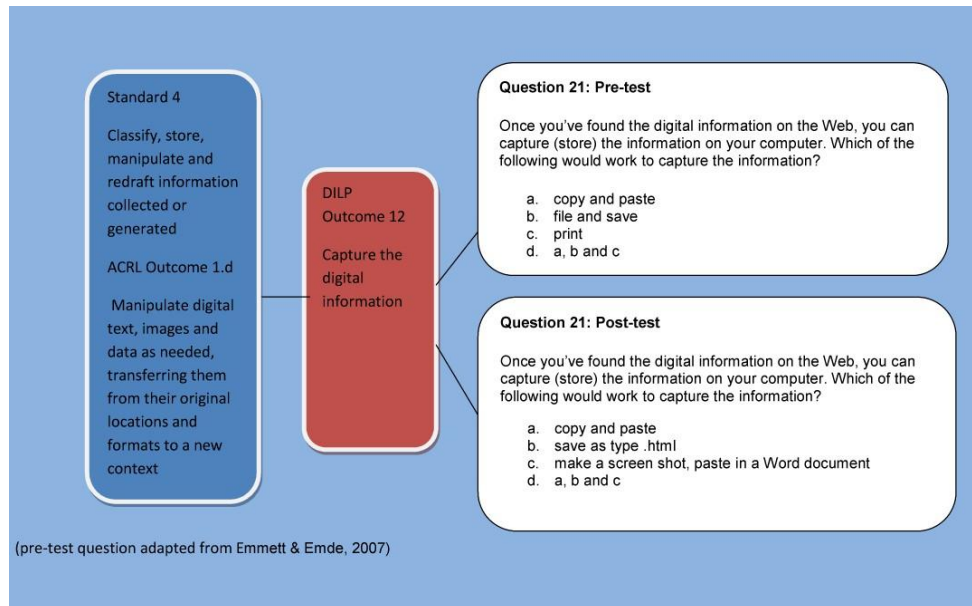
(pre-test question adapted from Emmett & Emde, 2007)

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		
Post-test	x		

Comments (E&E): We have noticed informally that there seems to be a pattern to what the correct answers are, often either a) or d) with an "all of the above".

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 22
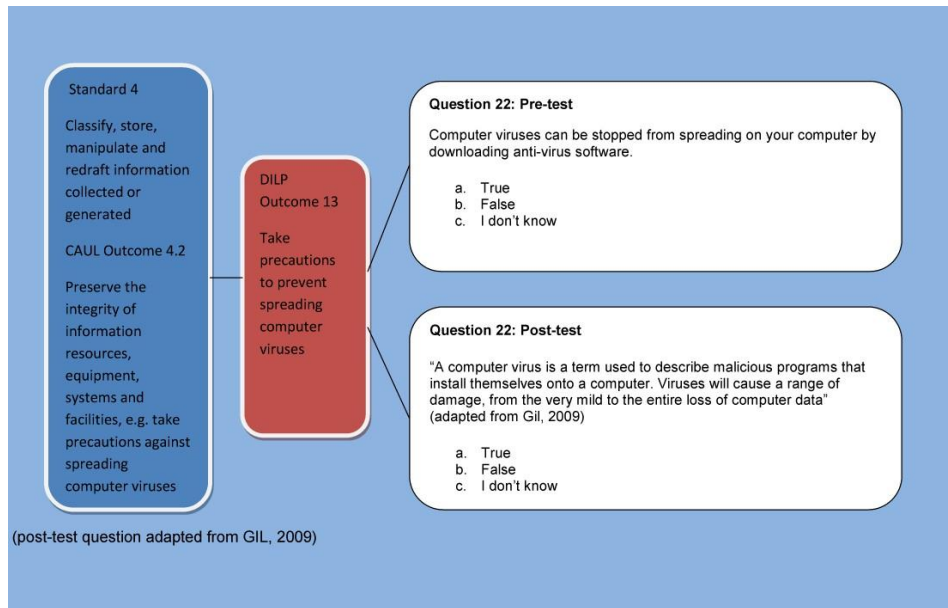
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		
Post-test	x		

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 23
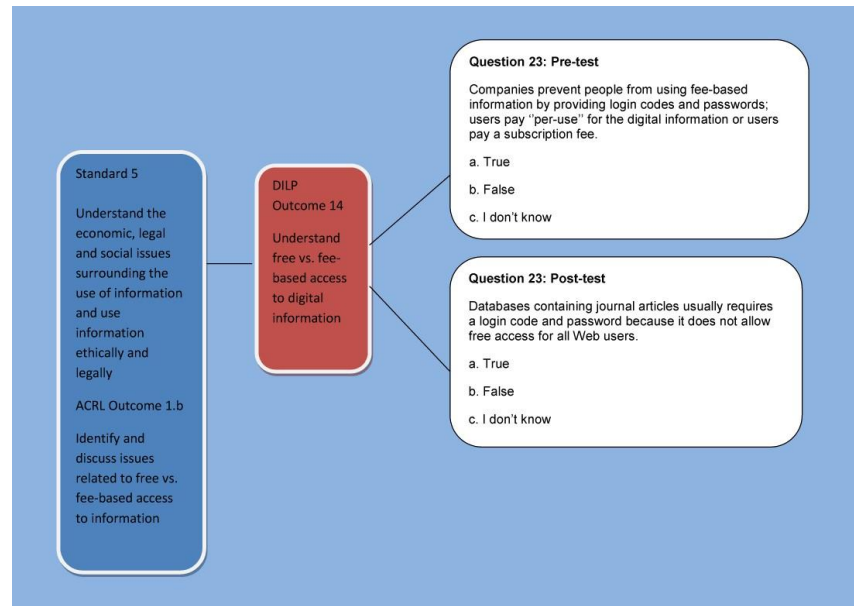
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		
Post-test	x		

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Comments (Esterhuizen): Just a note: is the economic issue regarding information covered by the reference to free/subscribed to information only, or is there also reference somewhere to the financial gain for the country by adding to its body of knowledge, etc. etc?

Question 24

Standard 5

Understand the economic, legal and social issues surrounding the use of information and use information ethically and legally

ACRL Outcome 1.d

Demonstrate an understanding of intellectual property, copyright and fair use of copyrighted material

DILP Outcome 15

Understand copyright and plagiarism

Question 24: Pre-test

Which of the following concepts makes it legally wrong to reproduce a substantial portion of the work of another person without permission?

a. Intellectual freedom

b. Freedom of speech

c. Right to privacy

d. Copyright

Question 24: Post-test

Copyright protection covers works

a. only if an explicit copyright notice (©, or Copyright by …) is displayed

b. that represent an original idea, in any format (text, music, picture, video)

c. only if they have been published

d. only digital information sources

(pre-test question from Radcliff, Salem, Gedeon & O'Connor, 2007)

(post-test question adapted from Bay Area Community Colleges Information Competency Assessment Project, 2004)

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		
Post-test	x		

Comments (E&E): Interestingly here we think that both the pre- and post-test questions do address the intended outcomes (pre-test more minimally however) but they aren't evenly weighted. So, if in the pre-test you want to know if they understand conceptually that copyright is a legal issue related to how people use works owned by others, that is fine. But in the post-test you are asking them to demonstrate that they understand the nuances of copyright. Also, your DILP should only mention copyright here.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 25

Standard 5

Understand the economic, legal and social issues surrounding the use of information and use information ethically and legally

ACRL Outcome 2.f

Demonstrate an understanding of what constitutes plagiarism and does not represent work attributable to others as his/her own

DILP
Outcome 15

Understand copyright and plagiarism

Question 25: Pre-test

You want to use some of the information found in an online journal article for your assignment. Which situation requires that you cite the source of your information to prevent plagiarism?

a.   When you copy a whole paragraph

b.   When you paraphrase a main point in your own words

c.   When you quote a sentence from the article

d.   a, b and c

Question 25: Post-test

You want to use some of the information found in an online journal article for your assignment. Which situation requires that you cite the source of your information to prevent plagiarism?

a.   The source was quoted word for word

b.   Only an *idea* was used in you assignment, the words were changed

c.   The source was from a Web page

d.   a, b and c

(pre-test question adapted from Bay Area Community Colleges Information Assessment Project, 2004)

(post-test question adapted from adapted from Anoka Ramsey Community College Library, 2007)

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		
Post-test	x		

Comments (E&E): Two comments. One is that your DILP should only mention plagiarism - since there is no copyright question. Second we aren't sure about some of the options given in your questions. We assume that "when you copy a whole paragraph" means when a student copies then indents or uses quotation marks to indicate that the writing is not his/hers. At least this is a requirement to avoid plagiarism. But since you have an option about when "you quote a sentence" we aren't sure what is meant. For the post-test we assume the answer is d).

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 26 (pre-test)

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		

Comments (E&E): Some citation styles might use the in-text citation differently but we like option b) as one citation style. Do you want to indicate in the question which style is to be applied; e.g. "assuming the use of the MLA style, which is the correct way to cite the source". We are familiar with the use of a style such as: (Smith, 2007). Using a corporate author or name of database, in our experience is far less common but possible.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		

Question 26 (post-test)

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Post-test	x		

Comments (E&E): See comments above.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Post-test	√		

Question 27 (pre-test)

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test			X does not match the DILP outcome

Comments (E&E): We are not sure that being able to identify whether the contents of a citation are a journal article, government source, etc, demonstrates the ability to **use** a citation and reference style. The ACRL Outcome 3.a seems to be a broader concept of "selecting" appropriate styles and your DILP Outcome 16 is narrower and doesn't match the question you are asking. Your question does seem to match the ACRL outcome 3.a.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		

Question 27 (post-test)

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Post-test			X does not match the DILP outcome

Comments: See comments in pre-test for 27.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Post-test	√		

Question 28 (pre-test)

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		

Comments (E&E): To match the outcome we suggest having three options and have the student chose the best one rather than the Yes/No/I don't know option that you currently have. This would help demonstrate their ability to discriminate between outlines that will serve their purposes and those that will not.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		

Question 28 (post-test)

Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Post-test	x		

Comments (E&E): See comments in pre-test

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Post-test	√		

Question 29
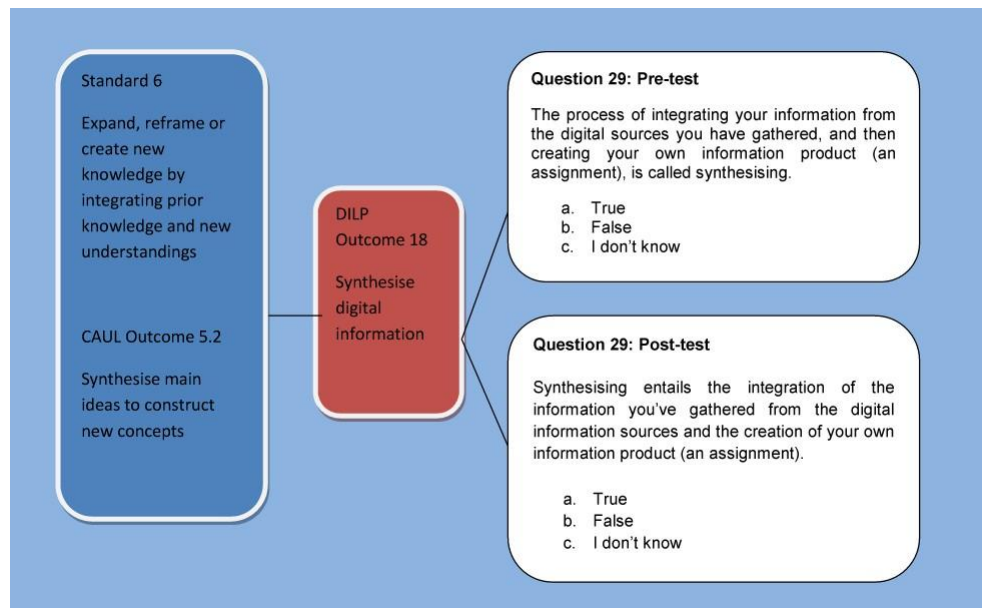
Emette & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test			x
Post-test			x

Comments (E&E): Here we feel strongly that a multiple choice question with one correct answer that demonstrates good synthesis of information (or at minimum a good definition of synthesis) would match your outcome.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 30
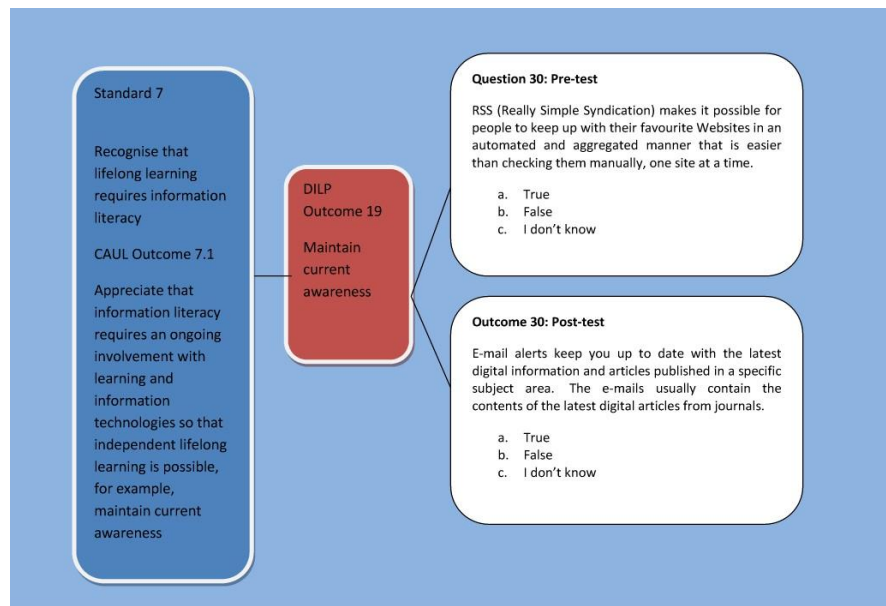
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	x		
Post-test	x		

Comments (E&E): Here again we think that the multiple choice kind of question allows for a better determination of the students' understanding and demonstration that the student meets the outcome. (We also note that many of your true/false questions seem to have the correct answer as "true".)

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Question 31
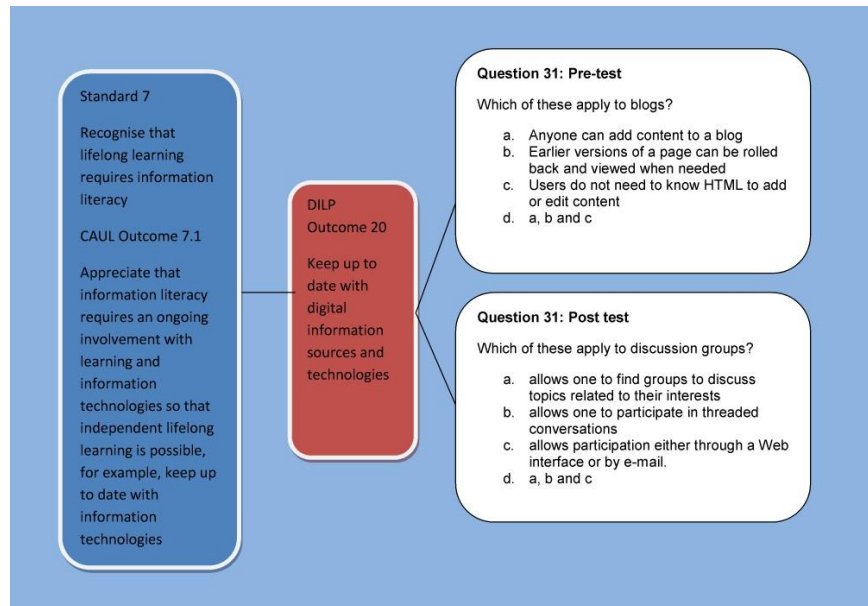
Emmett & Emde	Matched the outcome	Uncertain	Did not match the outcome
Pre-test			X
Post-test			X

Comments (E&E): These questions are identifying whether a student knows how specific digital alerting tools work rather than demonstrating that they **do** keep up to date with information sources. One solution around this problem is that you might shift the DILP outcome to match the intent of your questions AND provide a multiple choice list of possible alerting services (RSS, blogs, discussion groups) asking the student to identify "all those that are" alerting services. Just one idea to consider.

Esterhuizen	Matched the outcome	Uncertain	Did not match the outcome
Pre-test	√		
Post-test	√		

Skills to be demonstrated by students

The following table lists the skills students need to demonstrate as a result of the digital information literacy program. According to Hernon and Dugan (2002:66), outcomes focus on the competencies, namely skills. The skills are based on the outcomes as defined by the Information Competency Standards of the ACRL (2000) and the Information Literacy Standards of CAUL (2001).

Table D.1: Skills to be demonstrated by students in units of the DILP

	Skills to demonstrate in Unit 1 – The student can
1	understand the need to find and use digital information
2	define a topic
3	refine the topic
4	explore general digital information sources

	Skills to demonstrate in Unit 2 – The student can
5	select the most appropriate digital information sources for finding the required digital information
6	select the most appropriate digital information access tools for finding digital information
7	construct and carry out an effective digital search strategy

	Skills to demonstrate in Unit 3 - The student can
8	evaluate the quality of a digital information source using multiple criteria, including authority, currency, content and reviews
9	use the criteria

	Skills to demonstrate in Unit 4 -The student can
10	identify various digital information formats
11	create a system for organising the digital information
12	capture the digital information

	Skills to demonstrate in Unit 4 -The student can
13	take precautions to avoid the spreading of computer viruses.
14	know what digital storytelling is

	Skills to demonstrate in Unit 5 - The student can
15	organise digital information
16	synthesise the digital information found

	Skills to demonstrate in Unit 6 - The student can
17	understand free versus fee-based access to digital information
18	understand copyright and plagiarism
19	use a citation and bibliographic reference style.

	Skills to demonstrate in Unit 7 - The student can
20	maintain current awareness by keeping up to date with digital information sources and technologies
21	recognise social networking sites

Appendix E

Mapping of questions to standards and outcomes with evidence of validity, based on expert ratings of the items

Figure E.1: Question 1 pre- and post-test content validity

Standard 1

CAUL Outcome 1.1

Defines and articulates the need for information

Outcome 1

Understand the need to find and use digital information

Question 1: Pre-test

We need information when we want to

a. Revise our diet
b. Plan a holiday
c. Write an assignment
d. a, b and c

Question 1: Post-test

We need information when we want to

a. Revise our exercise routine
b. Plan a long weekend
c. Write an assignment
d. a, b and c

(pre- and post-test questions adapted from Sullivan, 2006:21)

The literacy experts had no comments regarding the questions and they were of the opinion that the questions matched the outcome.

Figure E.2: Question 2 pre- and post-test content validity

Standard 1

ACRL Outcome 1.c

Explore general information sources to increase familiarity with the topic

Outcome 1

Understand the need to find and use digital information

Question 2: Pre-test

You have to write an assignment on a topic about which you know very little. What's the first thing you should do to get started?

a. Browse the library shelves for books on your topic
b. Search the Internet
c. Find out some basics on your topic from a reference source such as an encyclopaedia
d. a, b and c

Question 2: Post-test

You have to write an assignment on a topic about which you know very little. What's the first thing you should do to get started?

a. Search for the topic in the library's online catalogue
b. Type the topic in a Web search engine such as Google
c. Find some basics on your topic from a general digital information source such as an encyclopaedia
d. a, b and c

(pre- and post-test questions adapted from Sullivan, 2006:24)

Option a. in the pre-test was changed to "online catalogue" as "library shelves" is not a digital

information literacy source. The phrase "What's the first thing you should do to get started?" was changed to "What do you do to get started?" as the literacy experts reasoned that the first phrase indicates that there is only one way that is acceptable.

Figure E.3: Changed question 2 pre- and post-test

Standard 1

Determine the nature and extent of the information needed

ACRL Outcome 1.c

Explore general information sources to increase familiarity with the topic

DILP Outcome 1

Understand the need to find and use digital information

Question 2: Pre-test

You have to write an assignment on a topic about which you know very little. What do you do to get started?

a. Browse the online catalogue of the library for books on our topic
b. Search the Internet
c. Find out some basics on your topic from an online reference a digital encyclopaedia
d. a, b and c

Question 2: Post-test

You have to write an assignment on a topic about which you know very little. What do you do to get started?

a. Search for the topic in the library's online catalogue
b. Type the topic in a Web search engine such as Google
c. Find some basics on your topic from a digital/online source such as a subject specific encyclopaedia
d. a, b and c

(pre- and post-test questions adapted from Sullivan, 2006:24)

Option a. in pre-test: "library shelves" replaced with "online catalogue" as "library shelves" is not a digital information literacy source.

Changed phrase: "What's the first thing you should do to get started?" to "What do you do to get started?" as the literacy experts reasoned that the first phrase indicates that there is only one thing that is acceptable to do.

Figure E.4: Question 3 pre- and post-test content validity

Standard 1

ACRL Outcome 1.d

Define or modify the information need to achieve a manageable focus

Outcome 2

Define a topic

Question 3: Pre-test

Before searching for information on a topic, such as "violence in South African high schools", you would first

a. decide which Websites are appropriate for the search

b. divide the topic into concepts or terms

c. know which aspects of the topic are most important

d. b and c

Question 3: Post-test

Before searching for information on a topic, such as "the economic impact of the 2010 World Cup", you would first

a. decide which Websites are appropriate for the search

b. divide the topic into concepts or terms

c. know which aspects of the topic are most important

d. b and c

The literacy experts were of the opinion that the questions matched the outcome and therefore nothing was changed.

Figure E.5: Question 4 pre- and post-test content validity

Standard 1

ACRL Outcome 1.d

Define or modify the information need to achieve a manageable focus

Outcome 3

Refine a topic

Question 4: Pre-test

Before searching for information on a topic such as "violence in South African high schools" you decide to write about the *violence in high schools in the Western Cape*, you are refining your topic?

a. True

b. False

c. Don't know

Question 4: Post-test

Before searching for information on a topic such as "the economic impact of the 2010 World Cup" you decide to write about the *economic impact of the 2010 World Cup in Gauteng*, you are refining your topic?

a. True

b. False

c. Don't know

The literacy experts suggested that the topic should be presented with a multiple-choice set of answers to allow the students to demonstrate an understanding of what a narrower or broader topic is, and therefore their ability to refine the topic.

Figure E.6: Changed question 4 pre- and post-test
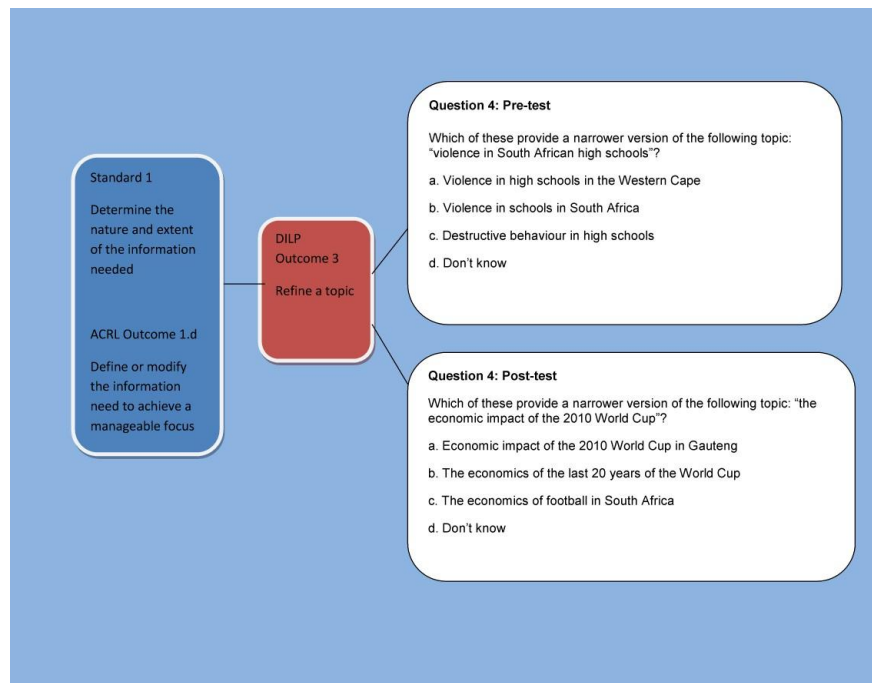
The topics in both the pre-test and post-test are presented with a multiple-choice set of answers to allow the students to demonstrate an understanding of what a narrower or broader topic is, and therefore their ability to refine the topic.

Figure E.7: Question 5 pre- and post-test content validity
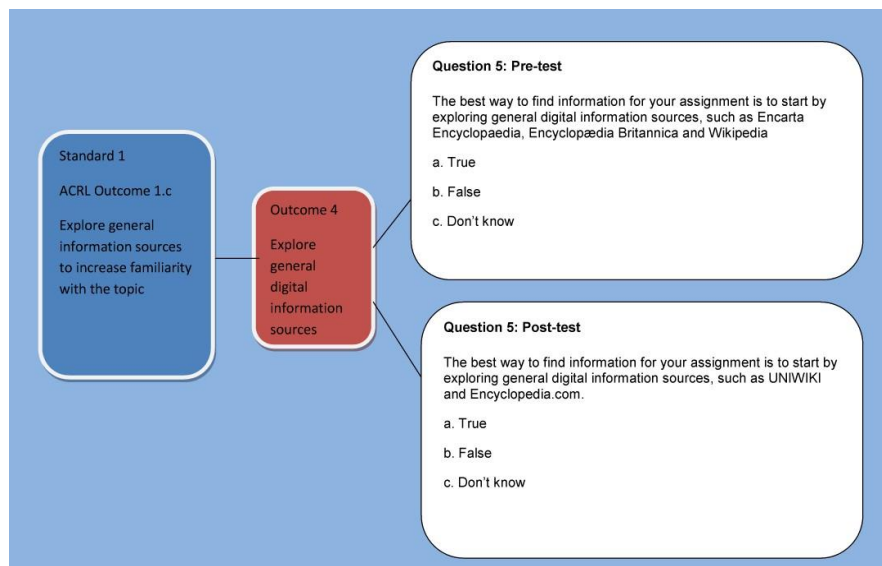
The information literacy experts suggested that the options provided should be multiple-choice instead of the True/False/Don't know options.

Figure E.8: Changed question 5 pre- and post-test

Standard 1

Determine the nature and extent of the information needed

ACRL Outcome 1.c

Explore general information sources to increase familiarity with the topic

DILP Outcome 4

Explore general digital information sources

Question 5: Pre-test

The best way to find information for your assignment is to start by exploring general digital information sources such as

a. Wikipedia

b. Encyclopedia.com

c. Encyclopaedia Britannica

d. a, b and c

Question 5: Post-test

The best way to find information for your assignment is to start by exploring general digital information sources such as

a. Encyclopaedia Britannica

b. UNIWIKI

c. Encyclopedia.com

d. a, b and c

Multiple-choice options were used instead of the True/False/Don't know options.

Figure E.9: Question 6 pre-test content validity

Standard 2

Access needed information effectively and efficiently

CAUL Outcome 2.1

Select the most appropriate investigative methods or information access tools for finding the needed information

DILP Outcome 5

Select the most appropriate digital information sources for finding the needed digital information

Question 6: Pre-test

For each information category on the left, circle the **number** of the ONE best source to use to find the information:

Digital source→ Information↓	Magazine (e.g. Drum)	Journal (e.g. Journal of Medical Research)	Book (e.g. Anatomy of the Human Body)	Encyclopaedia (e.g. Wikipedia)	Don't know
a. Current research on HIV/AIDS	1	2	3	4	5
b. Fashion, diet tips and celebrity information	1	2	3	4	5
c. Description of the Ndebele culture	1	2	3	4	5
d. Detailed information about the humerus (arm bone)	1	2	3	4	5

(pre-test question adapted from UCLA Library, 2001)

No changes were made to the pre-test question as the question matched the outcome, according to the information literacy experts.

Figure E.10: Question 6 post-test content validity

Standard 2

Access needed information effectively and efficiently

CAUL Outcome 2.1

Select the most appropriate investigative methods or information access tools for finding the needed information

DILP Outcome 5

Select the most appropriate digital information sources for finding the needed digital information

Question 6: Post-test

For each information category on the left, circle the number of the best source to use to find the information:

Digital source→ Information↓	Magazine (e.g. Drum)	Journal (e.g. Journal of Medical Research)	Book (e.g. Anatomy of the Human Body)	Encyclopaedia (e.g. Wikipedia)	Don't know
a. Current research on TB (Tuberculosis)	1	2	3	4	5
b. Exercise and lifestyle tips as well as TV programs	1	2	3	4	5
c. Description of the Tswana culture	1	2	3	4	5
d. Detailed information about the femur (thigh bone)	1	2	3	4	5

(pre-test question adapted from UCLA Library, 2001)

No changes were made to the post-test question as the question matched the outcome, according to the information literacy experts.

Figure E.11: Question 7 pre- and post-test content validity

Standard 2

CAUL Outcome 2.1

Select the most appropriate investigative methods or information access tools for finding the needed information

Outcome 6

Select the most appropriate digital information access tools for finding digital information

Question 7: Pre-test

The World Wide Web offers us various *tools* to access digital information sources. These *tools* include electronic databases, the Web itself and search engines.

a. True

b. False

c. Don't know

Question 7: Post-test

Tools to access digital information literacy skills include electronic databases, the Web itself and search engines. These tools can all be accessed using the World Wide Web (WWW).

a. True

b. False

c. Don't know

The literacy experts were of the opinion that this question did not offer a selection to choose from as stated in the outcome: "Select the most appropriate digital information access tool". A selection of digital information access tools was added as multiple-choice and the questions were changed.

Figure E.12: Changed question 7 pre- and post-test
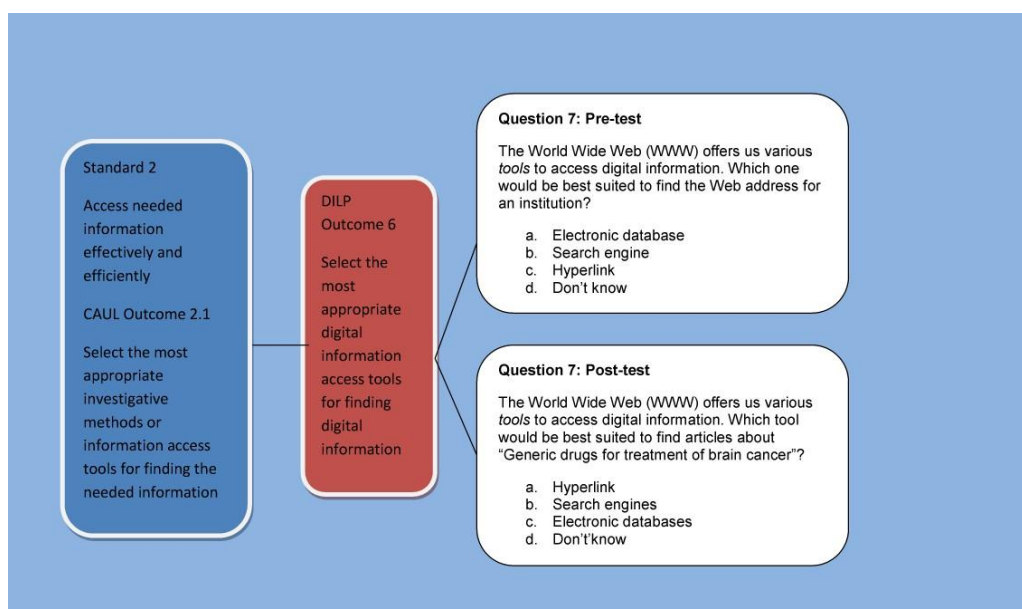
A selection of digital information access tools was added as multiple-choice and the questions were also changed in order to offer the students the opportunity to select the most appropriate digital information access tool as stated in the outcome.

Figure E.13: Question 8 pre- and post-test content validity
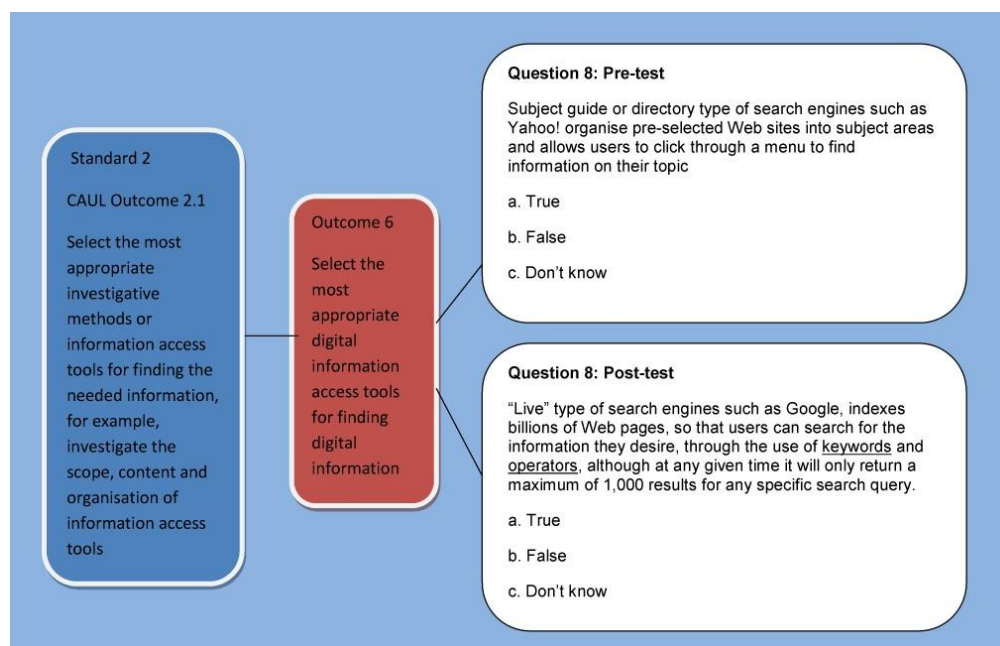
The literacy experts suggested changing the question to a question supplying the students with an information need and, through multiple-choice, give a series of options and asking the students which one is most appropriate.

Figure E.14: Changed question 8 pre- and post-test
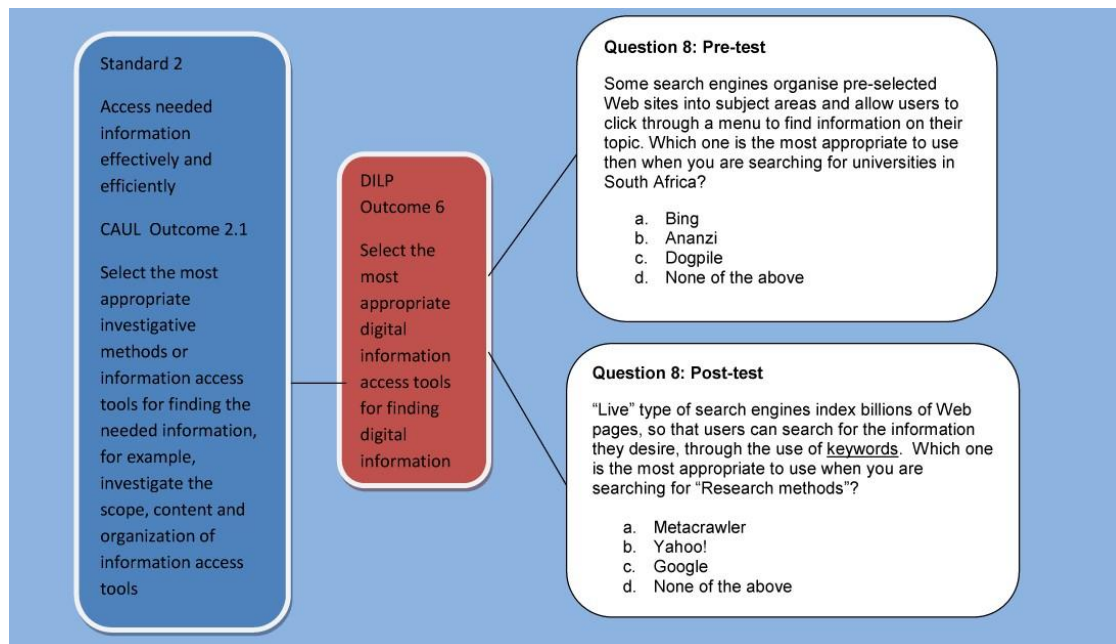
The questions were changed to a question supplying the students with an information need and, through multiple-choice, give a series of options and asking the students which one is most appropriate to match the outcome of selecting the most appropriate digital information access tool for finding digital information.

Figure E.15: Question 9 pre- and post-test content validity
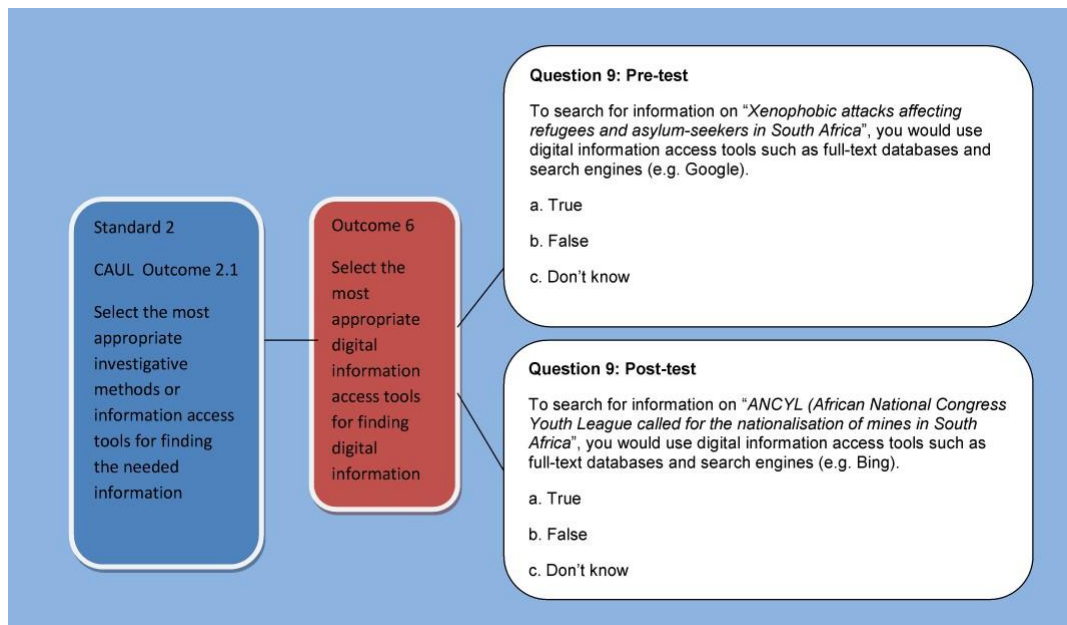
The literacy experts felt that there is not an obvious choice for the students to choose from as full-text databases and search eniges would both be appropriate places to find information on the specific subjects. The questions were therefore changed to provide a choice of various digital information access tools.

Figure E.16: Changed question 9 pre- and post-test
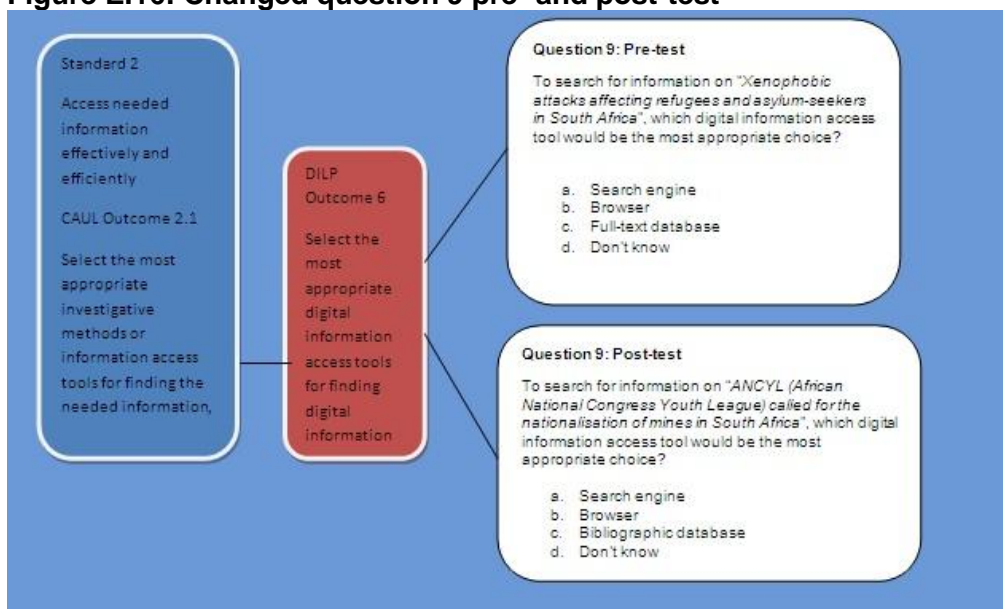
The questions were changed, providing a choice of various digital information access tools to meet the outcome of selecting an appropriate digital information access tool for finding digital information.

Figure E.17: Question 10 pre- and post-test content validity
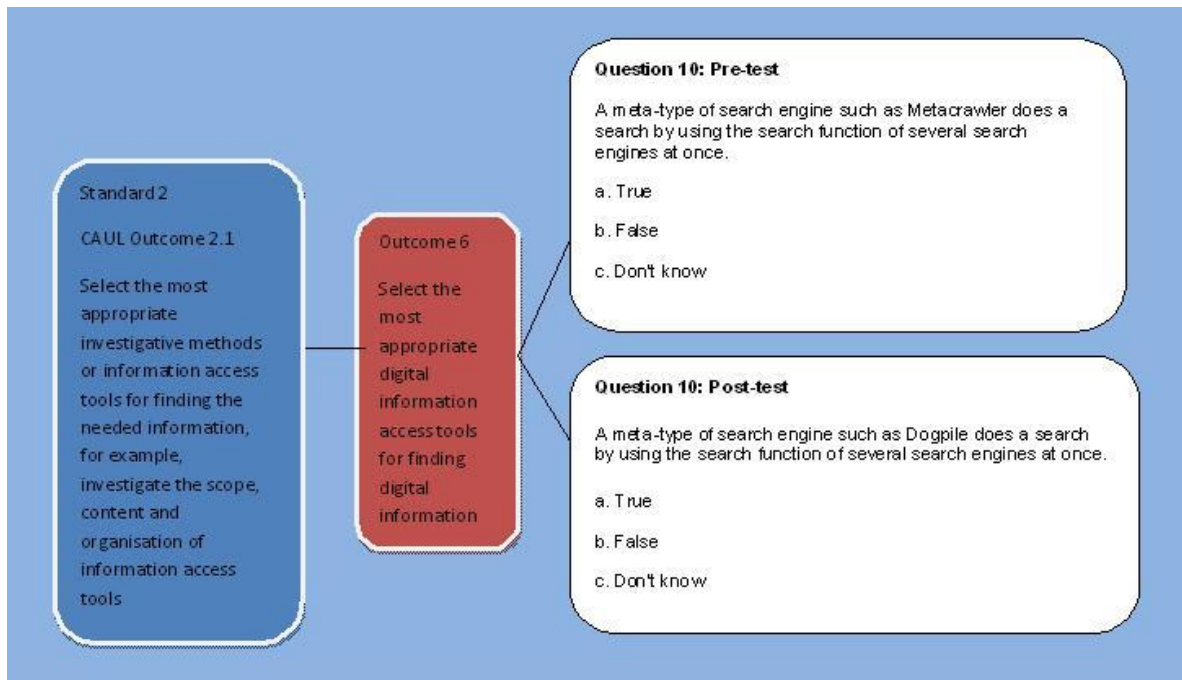
This question was deleted since there were enough questions gauging the students' understanding of what a given information source provides, thereby allowing them to decide whether it is an appropriate source to use. The literacy experts were also of the opinion that it did not match the outcome.

Figure E.18: Question 11 pre- and post-test content validity

Standard 2

CAUL Outcome 2.1

Select the most appropriate investigative methods or information access tools for finding the needed information, for example, investigate the scope, content and organization of information access tools

Outcome 6

Select the most appropriate digital information access tools for finding digital information

Question 11: Pre-test

Digital information such as journal articles can be retrieved from databases. Which statement/s about databases is true?

a. Databases allow you to search for full-text articles

b. Databases allow you to search for bibliographic references to articles

c. Full-text articles can be downloaded in html or PDF formats

d. All the statements are true

Question 11: Post-test

Digital information such as journal articles can be retrieved from databases. Which statement/s about databases is true?

a. Databases allow you to search for specific authors of journal articles

b. Databases allow you to search for specific titles of journal articles

c. Full-text articles can be saved in html or PDF formats

d. All the statements are true

According to the literacy experts, the question matched the outcome and therefore it was not changed.

Figure E.19: Question 12 pre- and post-test content validity

Standard 2

ACRL Outcome 2.d

Construct a search strategy using appropriate commands for the information retrieval system selected (for example, Boolean operators)

Outcome 7

Construct and carry out an effective digital search strategy

(pre- and post-test questions adapted from Neely, 2006:56)

Question 12: Pre-test

Which of the following search strategies will get the best information from searching a database on the topic? Circle the one you think is the best each search strategy.

"Discuss capital punishment as a deterrent to crime"

a. capital punishment OR crime

b. deterrent AND crime AND capital punishment

c. capital punishment AND crime

d. punishment AND crime

Question 12: Post-test

Which of the following search strategies will get the best information from searching a database on the topic? Circle the one you think is the best each search strategy.

"Describe the characteristics of an asthma or hay fever attack"

a. asthma OR hay fever

b. asthma OR hay fever AND characteristics

c. asthma AND hay fever

d. characteristics AND attack

The instructions were re-worded to "Circle the one you think is the best search strategy to start with", as there was a typing error as mentioned by the literacy experts. Option b. in the post-test was also changed by including brackets to make the search strategy more effective.

Figure E.20: Changed question 12 pre- and post-test

Standard 2

Access needed information effectively and efficiently

ACRL Outcome 2.d

Construct a search strategy using appropriate commands for the information retrieval system selected (for example, Boolean operators)

(pre- and post-test questions adapted from Neely, 2006:56)

DILP Outcome 7

Construct and carry out an effective digital search strategy

Question 12: Pre-test

Which of the following search strategies will get the best information when searching a database on the following topic?

"Discuss capital punishment as a deterrent to crime"

Circle the one you think is the best search strategy to start with.

a. capital punishment OR crime

b. deterrent AND crime AND capital punishment

c. capital punishment AND crime

d. punishment AND crime

Question 12: Post-test

Which of the following search strategies will get the best information when searching a database on the following topic?

"Describe the characteristics of an asthma or hay fever attack"

Circle the one you think is the best search strategy to start with.

a. asthma OR hay fever

b. (asthma OR hay fever) AND characteristics

c. asthma AND hay fever

d. characteristics AND attack

The instructions were re-worded to "Circle the one you think is the best search strategy to start with", due to a typing error as mentioned by the literacy experts. Option b. in the post-test was changed to include brackets to make the search strategy more effective.

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Figure E.21: Question 13 pre- and post-test content validity
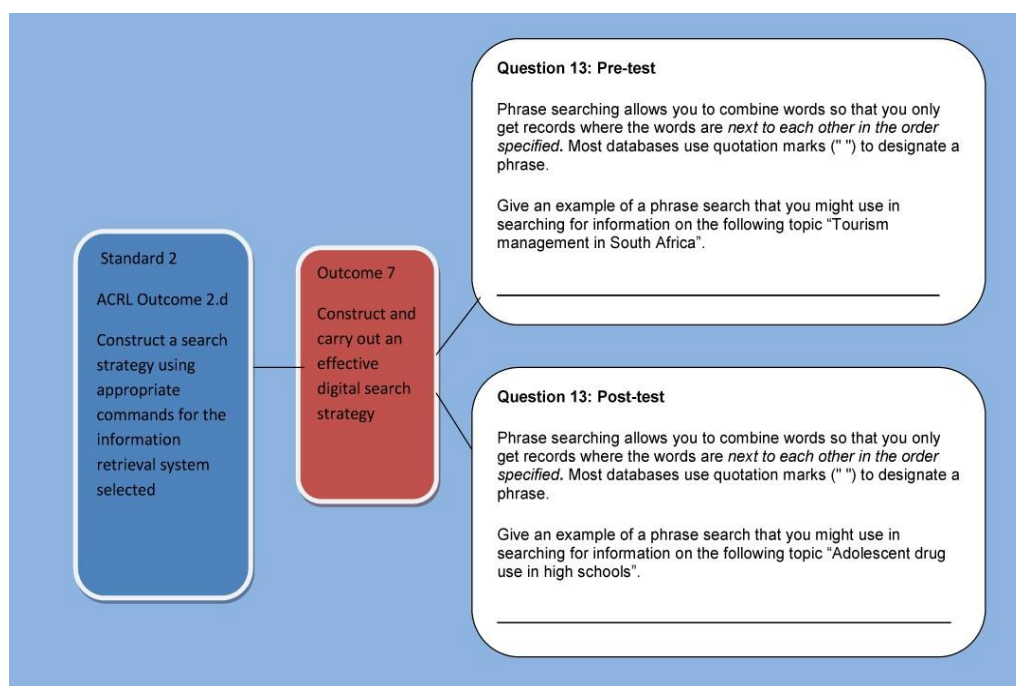
This question was not changed as the literacy experts agreed that the question matched the outcome.

Figure E.22: Question 14 pre- and post-test content validity
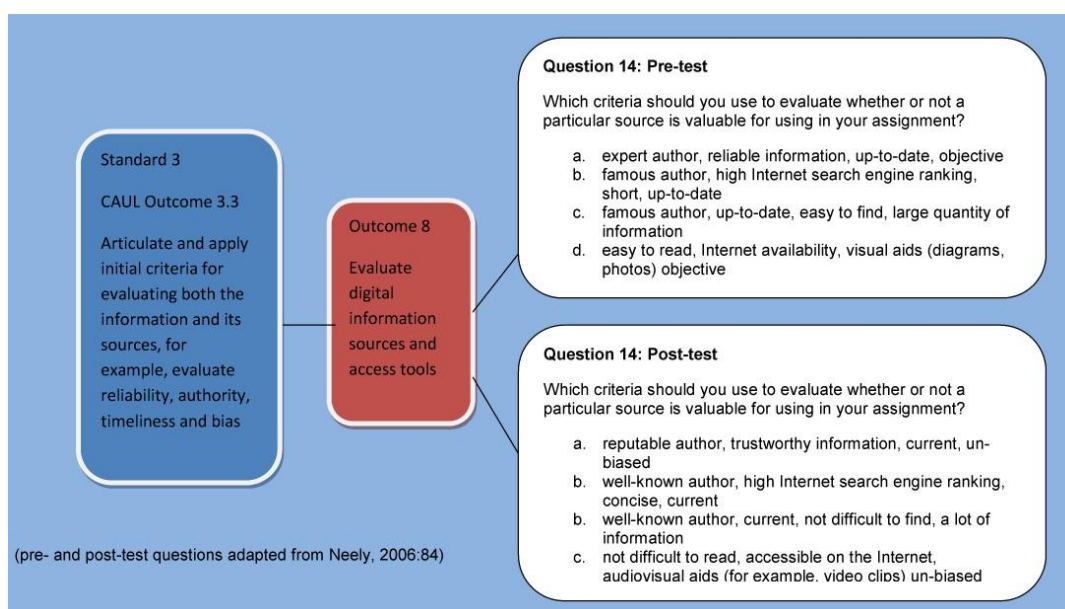
According to the literacy experts, the questions were mapped to the outcome and were therefore not changed.

Figure E.23: Question 15 pre- and post-test content validity
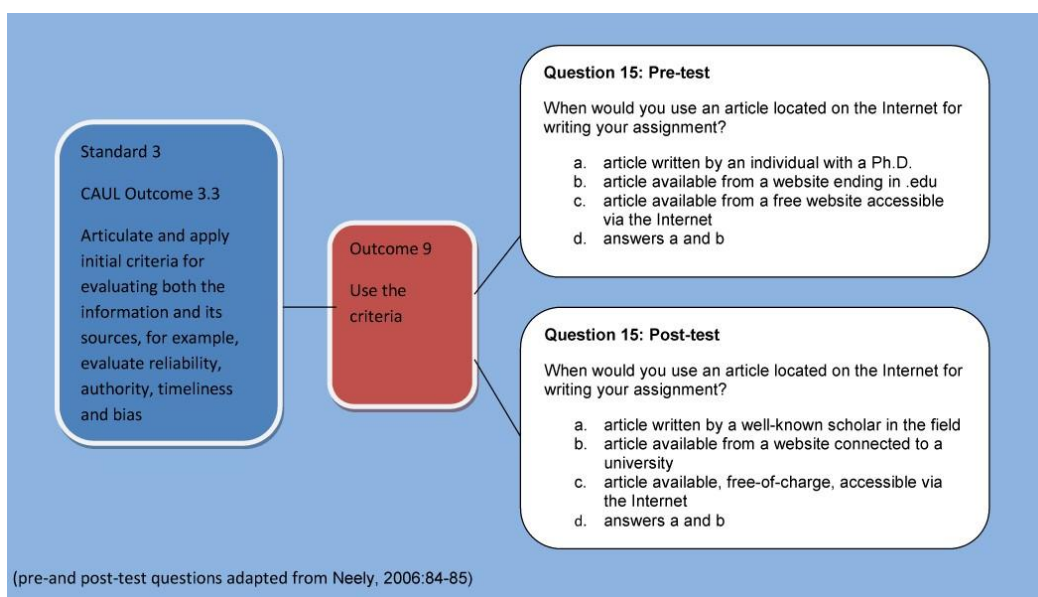
The information literacy experts suggested a change in the multiple-choice options, since the original option c. seemed to be a broader option and could very well include content from options a and b.

Figure E.24: Changed question 15 pre- and post-test
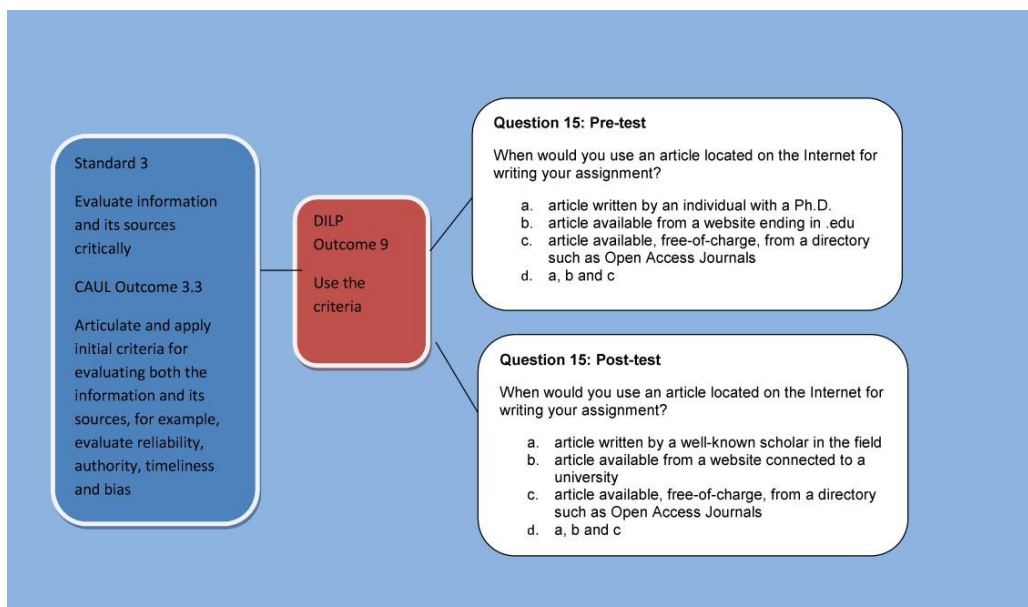
Changed multiple-choice in options c. for both the pre- and post-test to include a directory such as Open Access Journals, since the original option c. seemed to be a broader option and could very well include content from options a. and b.

Figure E.25: Question 16 pre- and post-test content validity

Question 16: Pre-test

When evaluating sources of digital information, the date of the source is only important in dealing with medical research

   a. True
   b. False
   c. Don't know

Question 16: Post-test

When evaluating sources of digital information, the date of the source is important depending on the topic

   a. True
   b. False
   c. Don't know

Standard 3

CAUL Outcome 3.3

Articulate and apply initial criteria for evaluation both the information and its sources, for example, examine timeliness

Outcome 9

Use the criteria

(pre-and post-test questions adapted from the Bay Area Community Colleges Information Competency Assessment Project, 2004)

This question was not changed as the information literacy experts were of the opinion that both the questions in the pre- and post-test were mapped to the outcome.

Figure E.26: Question 17 pre- and post-test content validity

Question 17: Pre-test

If you find a web page, what would be your best clue as to whether the page is a reliable source to use in writing your assignment?

   a. finding out which institution is hosting the Web page

   b. date of the last update of the page

   c. the quality of the page's graphic design

   d. a, b and c

Question 17: Post-test

If you find a web page, what would be your best clue as to whether the page is a reliable source to use in writing your assignment?

   a. the URL (http://www.......................)

   b. the links the page has

   c. the advertisements posted on the page

   d. the layout, font and pictures used on the Web page

Standard 3

CAUL Outcome 3.3

Articulate and apply initial criteria for evaluating both the information and its sources, for example, evaluate reliability, authority, timeliness and bias

Outcome 9

Use the criteria

(pre-and post test questions adapted from Neely, 2006:90 and Bay Area Community Colleges Information Competency Assessment Project, 2004)

The literacy experts indicated that they are unsure whether options a. and d. in the post-test are the intended answers in terms of indicators of authority. The multiple-choice options for the post-test were therefore changed.

Figure E.27: Changed question 17 post-test
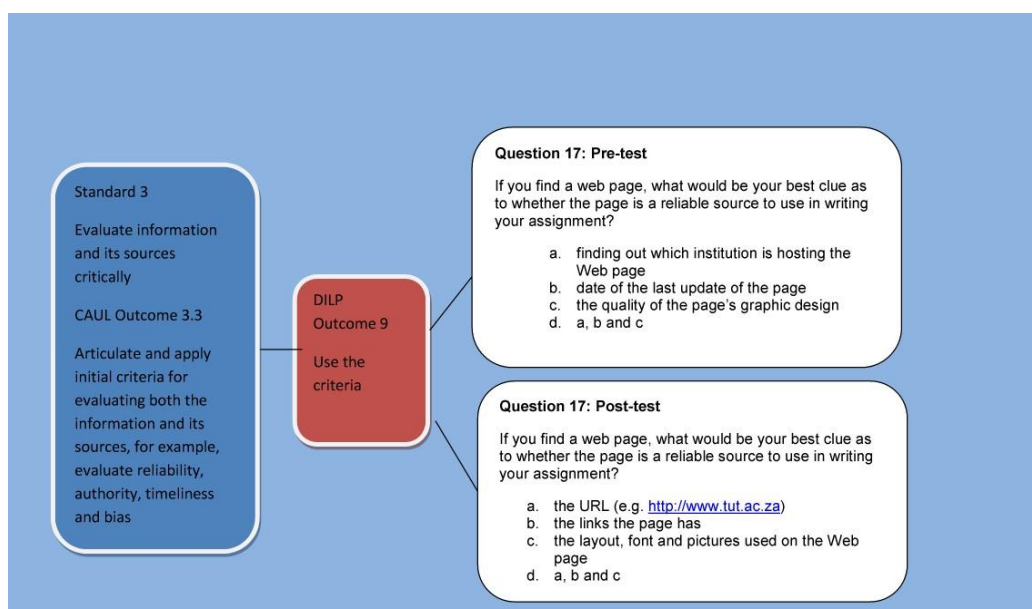
The multiple-choice options a. and d. of the post-test were changed by adding a full URL to option a., deleting option c. as this is not an indicator of authority, and replacing that with the old option d., whilst adding the same option d. as in the pre-test.

Figure E.28: Question 18 pre- and post-test content validity
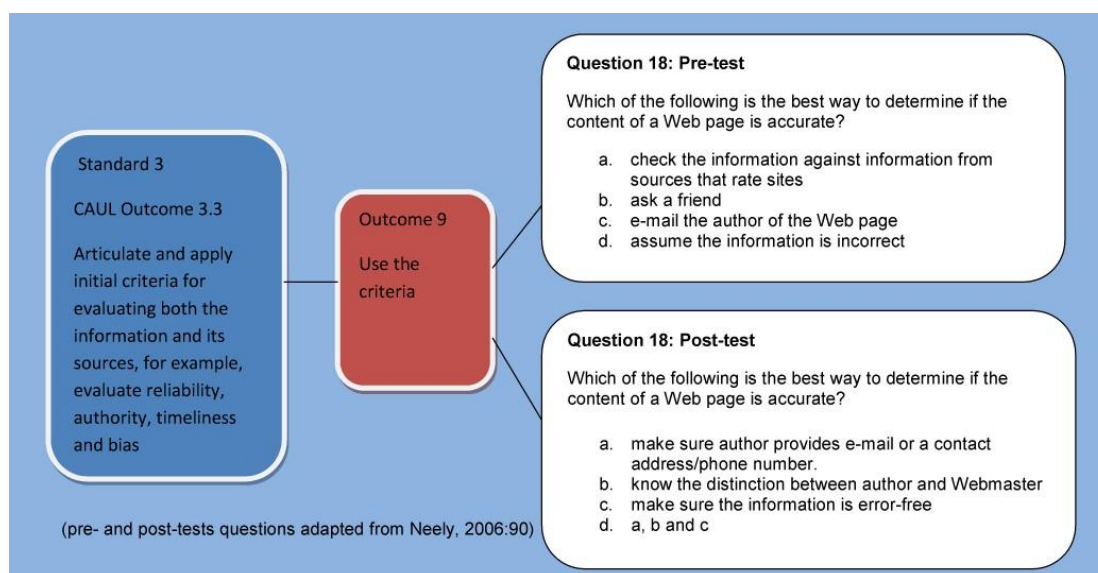
The literacy experts were of the opinion that the questions are mapped to the outcome and therefore the questions were not changed.

Figure E.29: Question 19 pre- and post-test content validity
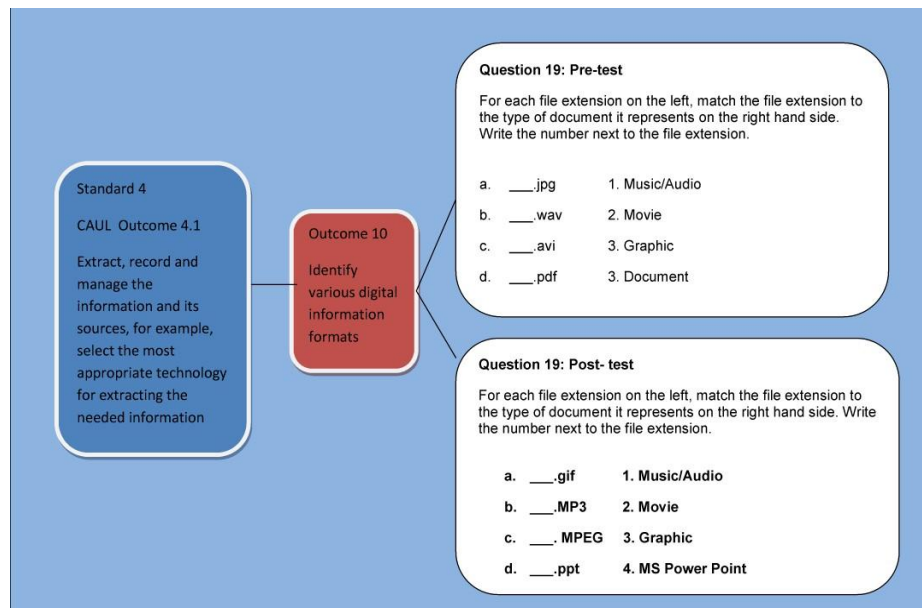
The literacy experts suggested to swap outcomes for this question with the ACRL outcomes of the next question, Question 20, and *vice versa,* as they are better suited the other way around.

Figure E.30: Changed outcome for question 19 pre- and post-test
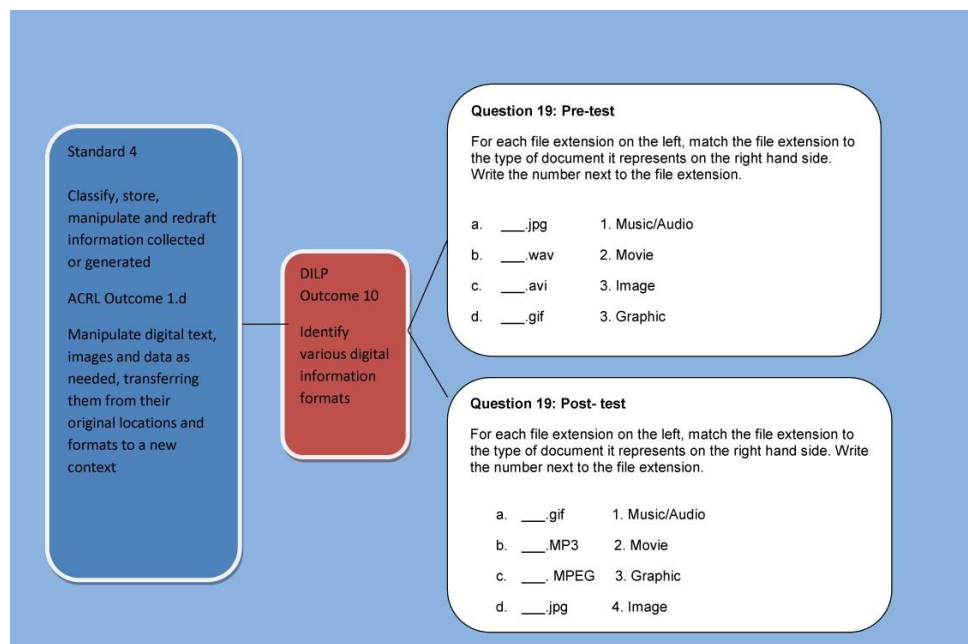
Swapped ACRL outcomes: "Extract, record and manage the information and its sources, for example, select the most appropriate technology for extracting the needed information" *with* "Manipulate digital text, images and data as needed, transferring them from their original locations and formats to a new context".

Figure E.31: Question 20 pre- and post-test content validity
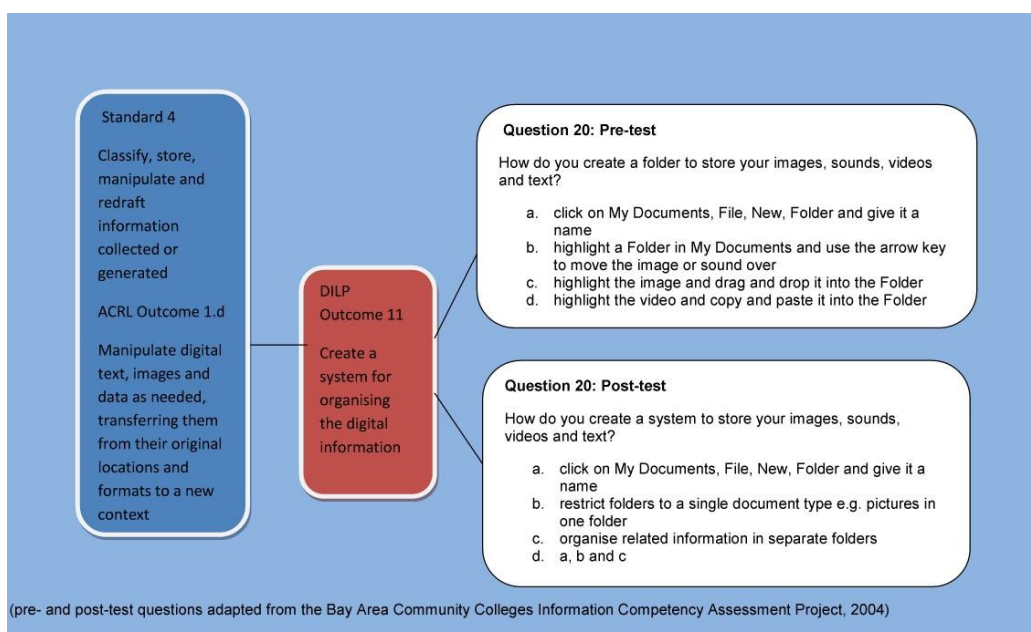
The literacy experts suggested to swap outcomes for this question with the ACRL outcomes of the previous question, Question 19, and *vice versa,* as they are better suited the other way around.

Figure E.32: Changed outcomes for Question 20 pre- and post-test
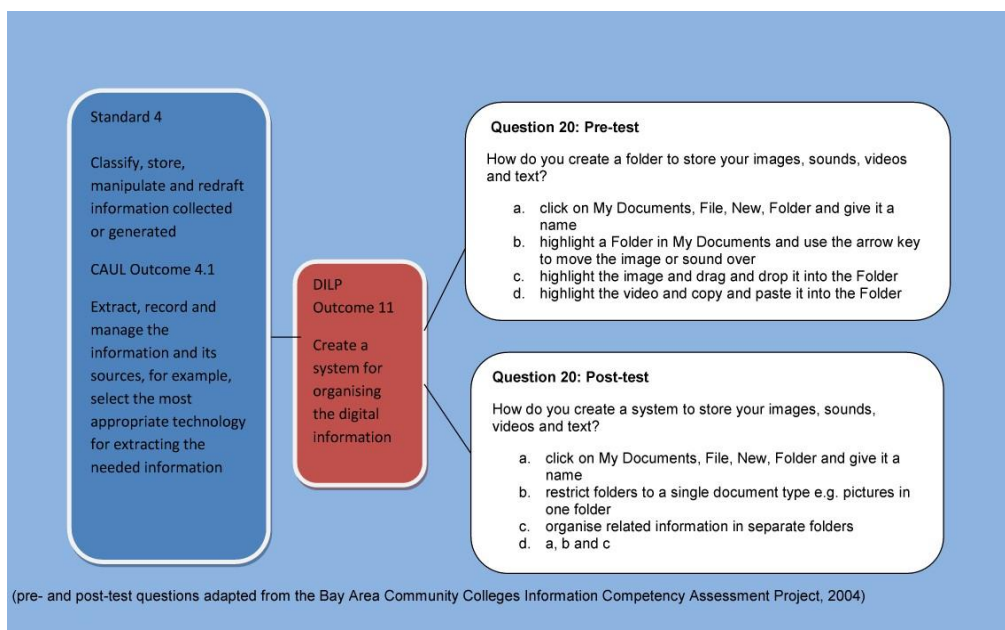
Swapped ACRL outcomes: "Manipulate digital text, images and data as needed, transferring them from their original locations and formats to a new context" *with "*Extract, record and manage the information and its sources, for example, select the most appropriate technology for

extracting the needed information".

Figure E.33: Question 21 pre- and post-test content validity
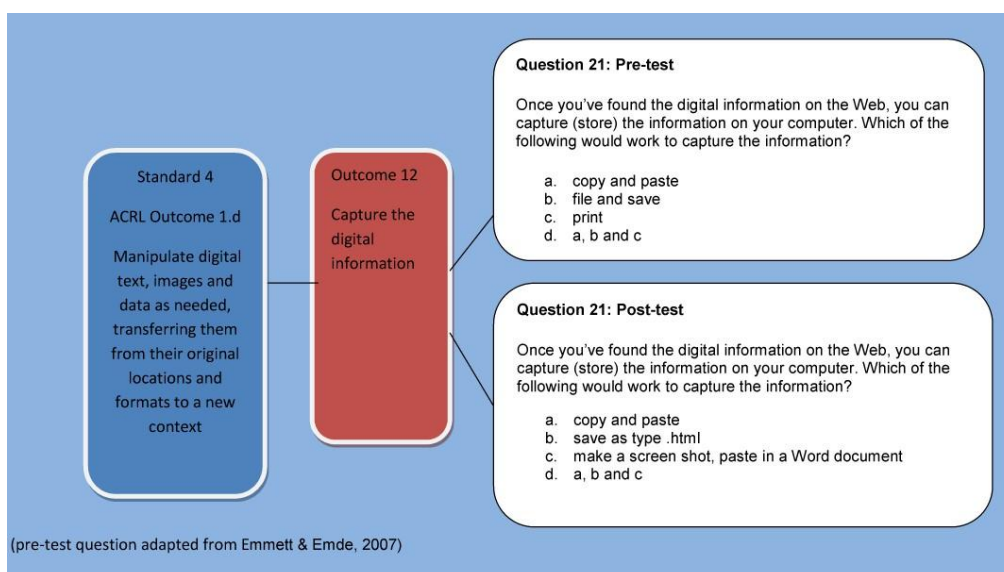
The literacy experts agreed that the questions are mapped to the outcome.

Figure E.34: Question 22 pre- and post-test content validity
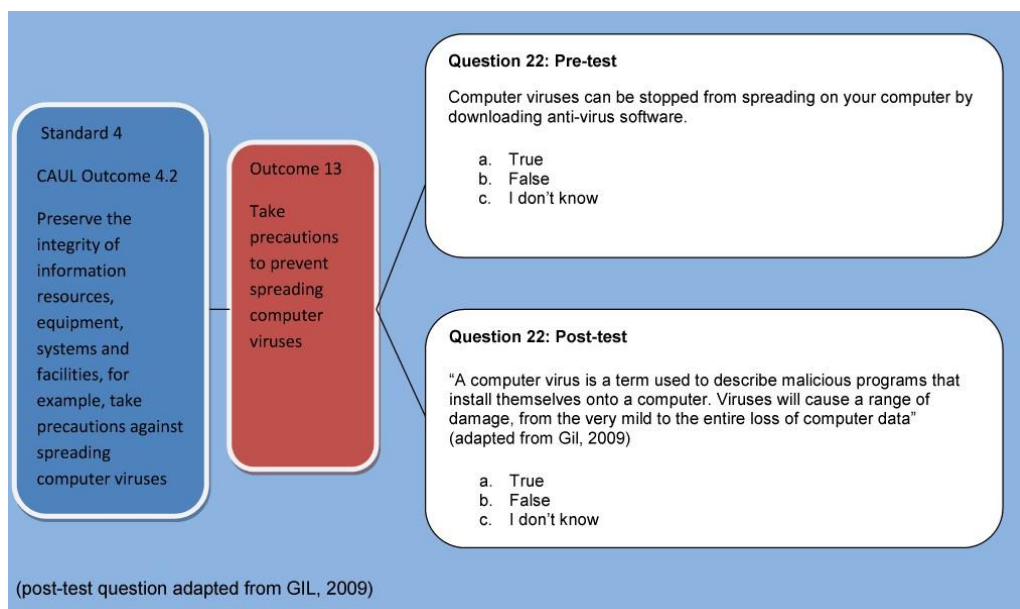
Once again, it was agreed that the questions for both the pre- and post-test are mapped to the outcome and therefore they were not changed. Another question was added after this question, since a new learning technology was added to the DILP, namely digital storytelling.

Figure E.35: Added question - digital storytelling
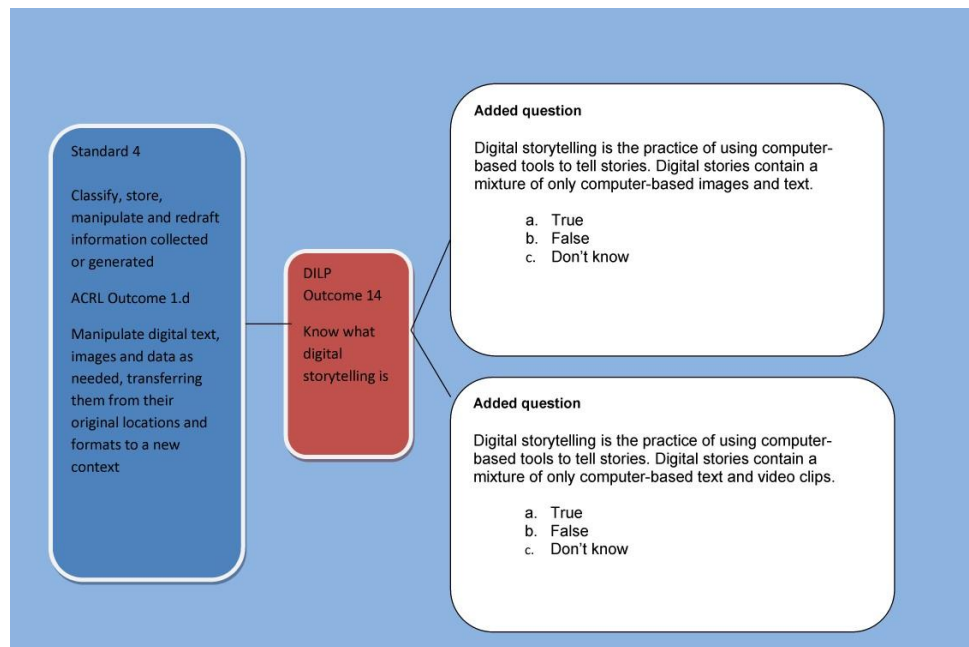
Added question on digital storytelling to the pre- and post-test.

Figure E.36: Question 23 pre- and post-test content validity
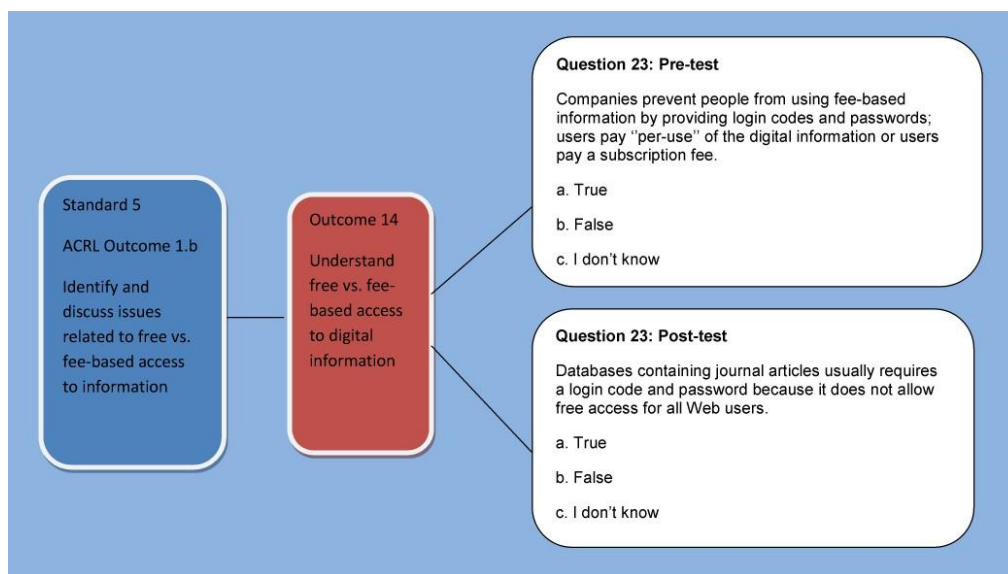
The literacy experts agreed that the questions matched the outcome and therefore no changes were made.

Figure E.37: Question 24 pre- and post-test content validity

(pre-test question from Radcliff, Salem, Gedeon & O'Connor, 2007)

(post-test question adapted from Bay Area Community Colleges Information Competency Assessment Project, 2004)
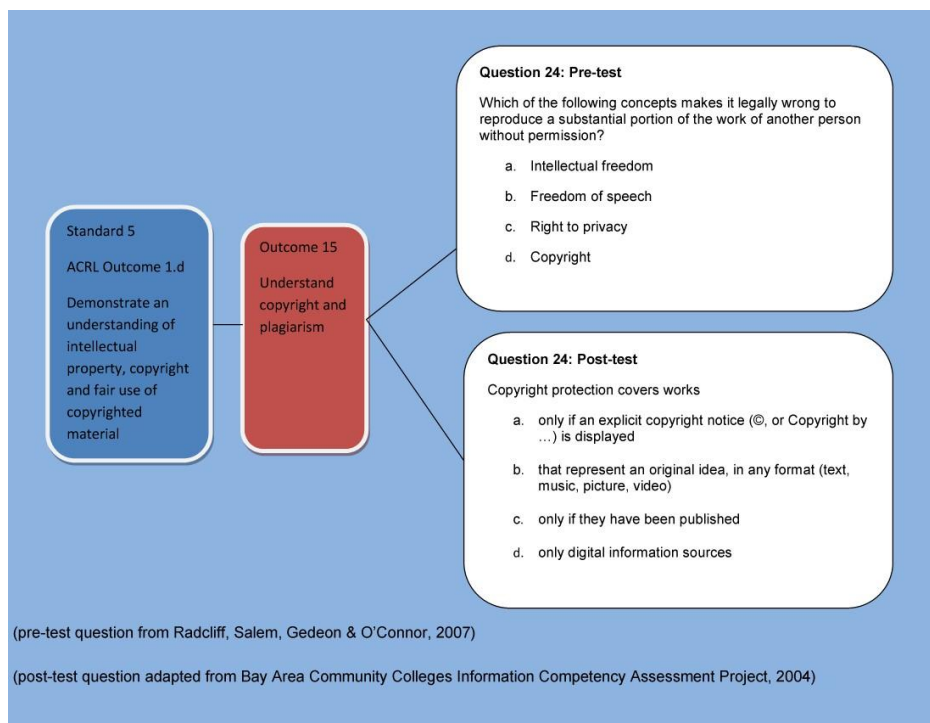
Although the literacy experts agreed that the questions are mapped to the outcome, it was mentioned that the questions were not evenly weighted and the questions were subsequently changed.

Figure E.38: Changed question 24 pre- and post-test

(pre- and post-test questions adapted from the Bay Area Community Colleges Information Competency Assessment Project, 2004)
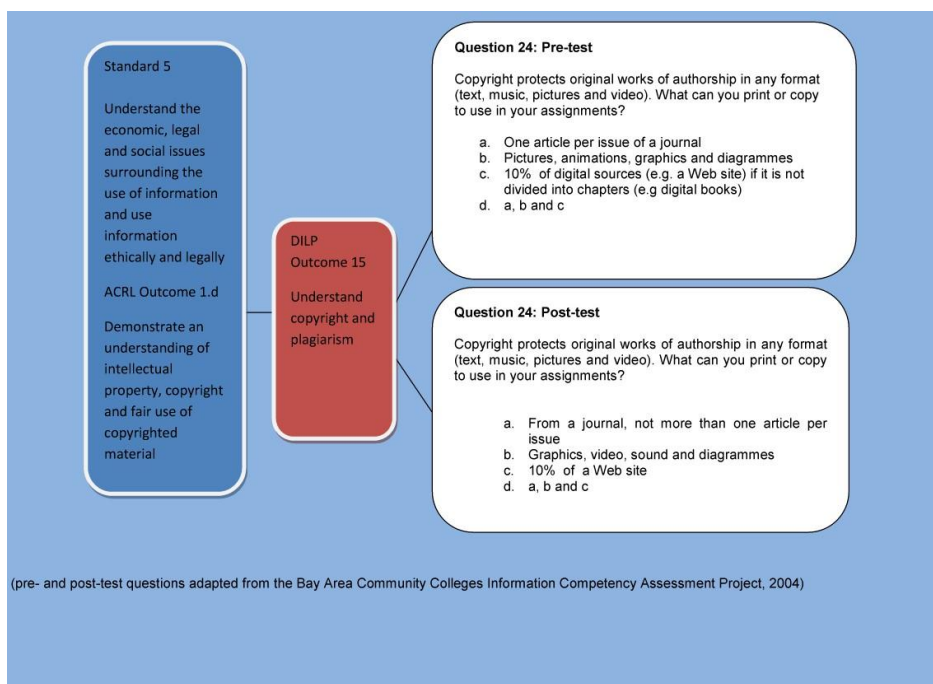
Since the questions were not evenly weighted, the questions were changed to be similar and the options were changed to correspond, ensuring that the questions for both the pre- and post-test are evenly weighted.

Figure E.39: Question 25 pre- and post-test content validity

Standard 5

ACRL Outcome 2.f

Demonstrate an understanding of what constitutes plagiarism and does not represent work attributable to others as his/her own

Outcome 15

Understand copyright and plagiarism

Question 25: Pre-test

You want to use some of the information found in an online journal article for your assignment. Which situation requires that you cite the source of your information to prevent plagiarism?

a. When you copy a whole paragraph

b. When you paraphrase a main point in your own words

c. When you quote a sentence from the article

d. a, b and c

Question 25: Post-test

You want to use some of the information found in an online journal article for your assignment. Which situation requires that you cite the source of your information to prevent plagiarism?

a. The source was quoted word for word

b. Only an *idea* was used in you assignment, the words were changed

c. The source was from a web page

d. a, b and c

(pre-test question adapted from Bay Area Community Colleges Information Assessment Project, 2004)

(post-test question adapted from adapted from Anoka Ramsey Community College Library, 2007)

The literacy experts agreed that the questions match the outcome, but were uncertain about some of the multiple-choice options as the requirements to avoid plagiarism are not truly met.

Figure E.40: Changed question 25 pre- and post-test

Question 25: Pre-test

You want to use some of the information found in an online journal article for your assignment. Which situation requires that you cite the source of your information to prevent plagiarism?

    a.   When you copy a whole paragraph and indents the paragraph

    b.   When you paraphrase a main point in your own words

    c.   When you quote a sentence from the article (using quotation marks)

    d.   a, b and c

Standard 5

Understand the economic, legal and social issues surrounding the use of information and use information ethically and legally

ACRL Outcome 2.f

Demonstrate an understanding of what constitutes plagiarism and does not represent work attributable to others as his/her own

DILP Outcome 15

Understand copyright and plagiarism

Question 25: Post-test

You want to use some of the information found in an online journal article for your assignment. Which situation requires that you cite the source of your information to prevent plagiarism?

    a.   The source was quoted word for word, using quotation marks

    b.   Only an idea was used in your assignment, the words were changed

    c.   You've copy and pasted 1 sentence from a Web site into your assignment

    d.   a, b and c

(pre-test question adapted from Bay Area Community Colleges Information Assessment Project, 2004)

(post-test question adapted from adapted from Anoka Ramsey Community College Library, 2007)

Some of the multiple-choice options were changed by adding, for instance, "indent the paragraph" and "using quotation marks" as these are requirements to avoid plagiarism.

Figure E.41: Question 26 pre-test content validity

Question 26: Pre-test

Take a look at the paragraph below. Assuming that you needed to add some of this information into the assignment you are writing, please select from the citations (a-d) the correct why to cite the source.

Original passage: (Copyright © The Nobel Foundation 1993 http://nobelprize.org/nobel_prizes/peace/laureates/1993/mandela-bio.html)

Nelson Mandela was released on February 11, 1990. After his release, he plunged himself wholeheartedly into his life's work, striving to attain the goals he and others had set out almost four decades earlier. In 1991, at the first national conference of the ANC held inside South Africa after the organization had been banned in 1960, Mandela was elected President of the ANC.

a. According to the Nobel Foundation (1993) Nelson Mandela was released on 11 February 1990.

b. Nelson Mandela was released on February 11, 1990 (The Nobel Foundation, 1993)

c. Nelson Mandela was released on the 11th of February in 1990

d. a and b

Standard 5

ACRL Outcome 3.a

Select an appropriate documentation style and use it consistently to cite sources

Outcome 16

Use a citation and bibliographic reference style

(pre-test question adapted from Emmett & Emde, 2007)

The questions matched the outcome, according to the information literacy experts.

Figure E.42: Question 26 post-test content validity

According to the information literacy experts, the question matched the outcome.

Figure E.43: Question 27 pre-test content validity
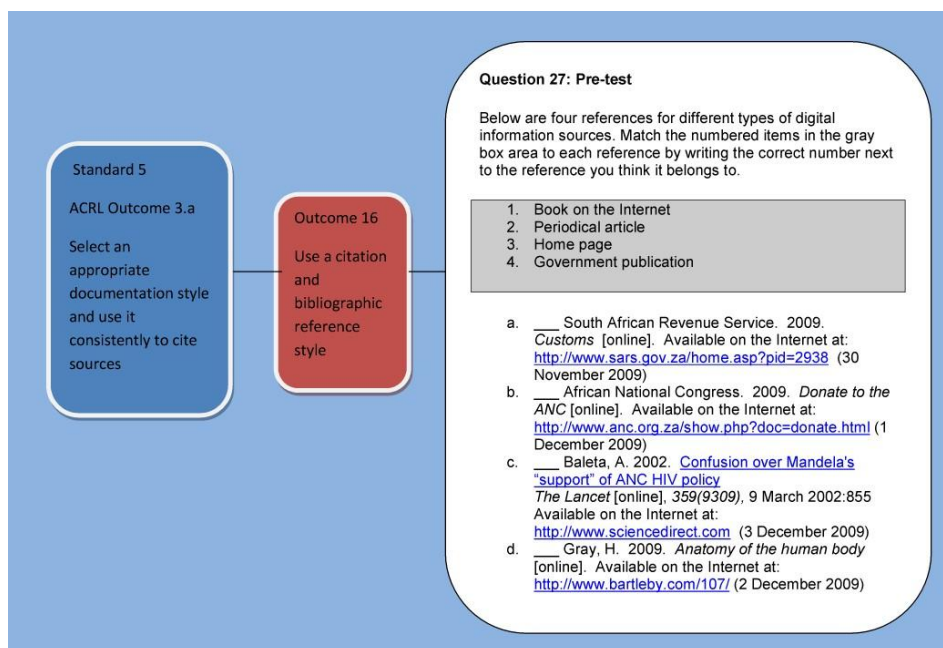
According to the literacy experts, the ability to identify whether the contents of a citation are for a journal article, government source, *etcetera*, does not demonstrate the use of a citation and reference style and the DILP outcome seems narrower than the ACRL outcome.

Figure E.44: Changed outcome for Question 27 pre-test
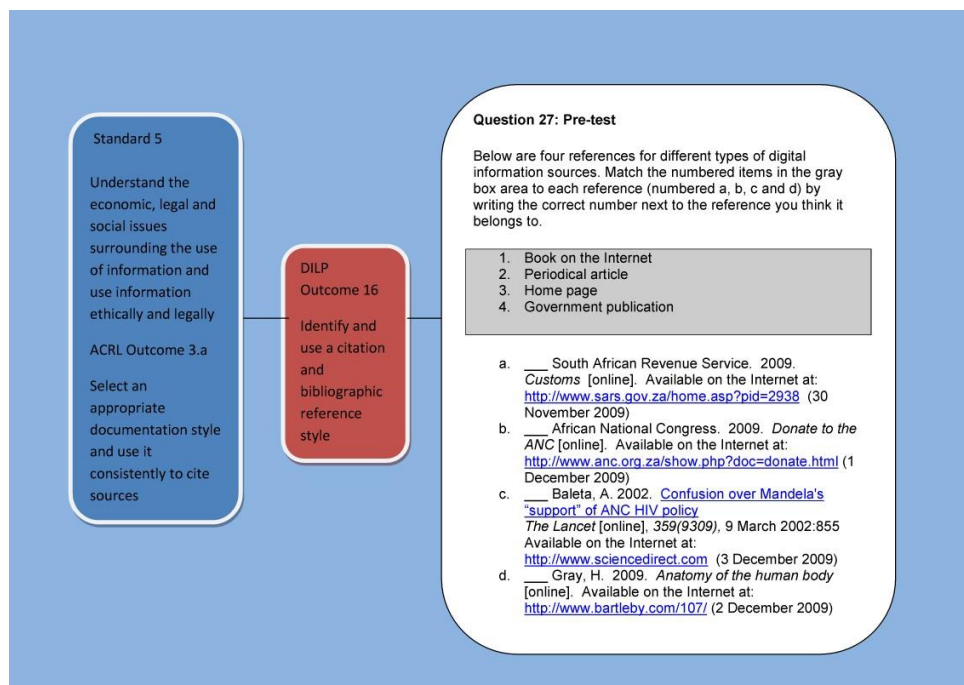
The outcome was changed by including "identify" to the outcome to truly map to the DILP outcome and the outcome in the DILP was subsequently changed.

Figure E.45: Question 27 post-test content validity
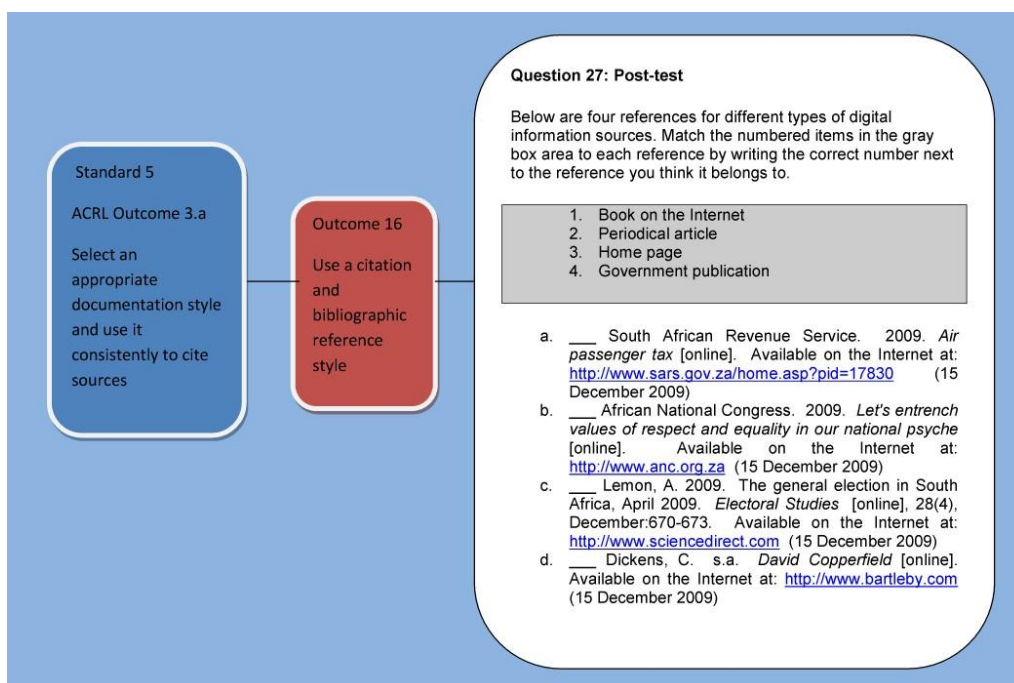
According to the literacy experts, the ability to identify whether the contents of a citation are for a

journal article, government source, *etcetera*, does not demonstrate the use of a citation and reference style and the DILP outcome seems narrower than the ACRL outcome.

Figure E.46: Changed outcome for Question 27 post-test

The outcome was changed by including "identify" in order for the question to truly map to the DILP outcome and the outcome in the DILP itself was subsequently changed.

Figure E.47: Question 28 pre-test content validity

The literacy experts agreed that the questions matched the outcome, but suggested having

three options and have the students choose the best one, rather than the Yes/No/I don't know option, to help demonstrate their ability to discriminate between outlines that will serve their purpose and those that will not. (Please refer to the complete pre- and post-test, Question 28 in Appendix F, Digital information literacy pre- and post-quiz and answer and scoring sheets).

Figure E.48: Question 28 post-test content validity

The literacy experts agreed that the questions matched the outcome, but suggested having three options and have the students choose the best one, rather than the Yes/No/I don't know option, to help demonstrate their ability to discriminate between outlines that will serve their pupose and those that will not. (Please refer to the complete pre- and post-test, Question 28 in Appendix F, Digital information literacy pre- and post-quiz and answer and scoring sheets).

Figure E.49: Question 29 pre-and post-test content validity
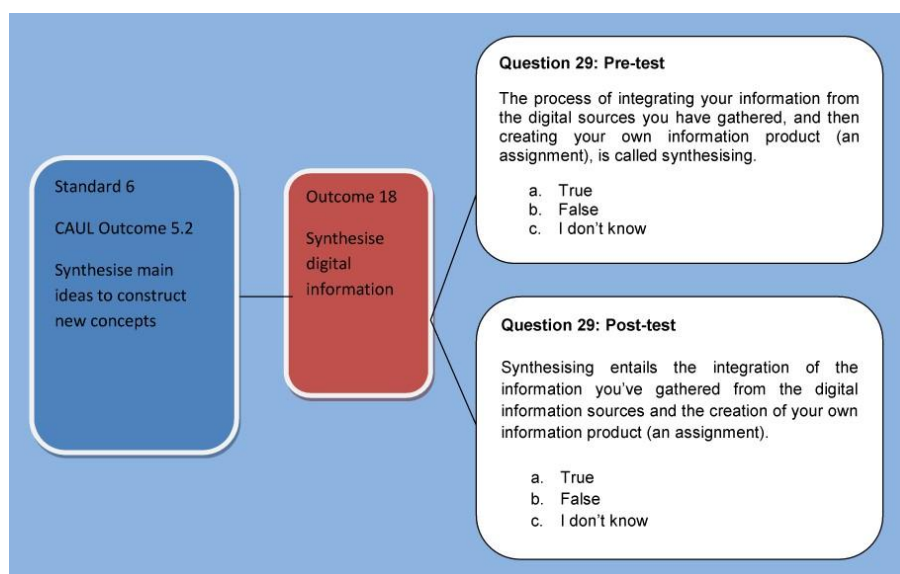
The literacy experts suggested the addition of an example that demonstrates good synthesis to map to the outcome.

Figure E.50: Changed question 29 pre-test

The process of integrating your information from the digital sources you have gathered, and then creating your own information product (an assignment), is called synthesising. Do you think the following is a good example of what an assignment should look like? (Considering that this is a shortened version of an assignment)

J.S. MOEKOENA

STUDENT NUMBER: 9603447

ND: CLINICAL THERAPY

CLINICAL THERAPY II

PET THERAPY

TABLE OF CONTENTS

1. Introduction
2. Pet therapy and the elderly
3. Projects in Cape Town
4. Conclusion
5. Bibliography

Lecturer: Mrs M. Mothobi

Date: 24 March 2010

PET THERAPY

1.Introduction

Therapy means the treatment of physical or mental disorders by non-surgical methods; for example occupational therapy, physiotherapy or psychotherapy. In pet therapy the special qualities that pets have are exploited to help people with problems. Pet therapy is used with, inter alia, disturbed children and handicapped people.

2. Pet therapy and the elderly

Old people living in South Africa today have specific problems. Research shows that x% live on incomes of less than R200 per month; y% have no contact with their families; z% depend on church support groups for food and clothing (Human Sciences Research Council, 1994:78-79)

It is perhaps this last quality that makes them so potentially therapeutic for old people. As Yvonne Carmen (1994:58) points out, they give comfort and solace to lonely residents of old-age homes.

3. Projects in Cape Town

Pet therapy in Cape Town began in an experimental way in 1992 as a project of the XXX (Behr, 1993:45).

This proved very successful. Measures of emotional well-being showed that regular contact with pets benefitted the residents of two old-age homes in Lansdowne and Bellville.

4.Conclusion

These projects prove the value of pet therapy for old people. The great advantage of pet therapy is its relatively low cost. The needs of the elderly are huge but resources are small. Volunteers can be used in pet therapy programmes as no specialised training is needed.

5.Bibliography

BEHR, J.A. 1993. Pet therapy and the elderly: a case study. *Compos mentis*, [online], 10 (3):45-49. Available at: http://www.cp.ac.za (7 Jan. 2010).

CARMEN, Yvonne. 1994. *Along came a dog* [online]. Available at: http://www.edwardarnold.co.uk (1 Feb. 2010)

HUMAN SCIENCES RESEARCH COUNCIL. 1994. *Report on the living standards of the elderly in South Africa* [online]. Available at: http://www.hsrc.org.za (2 Mar. 2010).

(www.lib.uct.ac.za)

a. No

b. Yes

c. Don't know

A shortened version of an assignment was added to demonstrate synthesis.

Figure E.51: Changed question 29 post-test

The process of integrating your information from the digital sources you have gathered, and then creating your own information product (an assignment), is called synthesising. Do you think the following is a good example of what an assignment should look like? (Considering that this is a shortened version of an assignment)

ND: MANAGEMENT

Human Resource Management II

MANAGING ABSENTEEISM

Lecturer: Mrs B Mokoena

Date: 1 March 2009

Name: Ms CZ Mbilini

Student number: 9603447

TABLE OF CONTENTS

1. Introduction
2. Reasons of absenteeism
3. Effects of absenteeism
4. Conclusion
5. Bibliography

1. Introduction

Absenteeism is a costly and disruptive problem and places unnecessary pressure on staff that are at work. Until they investigate, companies normally do not realize the cost of absenteeism until they actually measure it.

2. Reasons for absenteeism

According to Van der Merwe (1988:7-8) the reasons for absenteeism can be devided in three categories, namely personal factors, rganisational factors and attitudinal factors. Markowich (1996:116) states that some employees have the mentality that the "time is due to me - whether I'm sick or not", or see sick leave as "use-or-lose benefits".

4. Conclusion

What became clear in this study was that it is extremely important for staff to see that absenteeism would not be tolerated, otherwise it would lead to worsening absenteeism and a host of other negative effects on the workers and on the organisation. The sooner management and supervisors act on absenteeism, the better for the department, organisation and the employees.

5. Bibliography

Markowich, M M. Eckberg, S. 1996. Get control of the absentee-minded. *Personnel Journal* [online], 115-120, December. Available at: http://www.jp.ac.ru (1 Feb. 2010)

3. Effects of absenteeism

Absenteeism has many devastating effects on organisations all around the world. Perry (1997:9) states that: "The real cost of chronic absenteeism is lowered morale among other employees who must should the work load and lost revenue"

Perry, P M. 1997. Confronting the no-show. *American Nurseryman* [online], 185:89-95, January 15. Available at http://www.americannurse.com (7 Feb. 2010)

Van der Merwe, R. Miller, S. 1988. *Measuring absence and labour turnover* [online]. Available at: http://www.lexiconpublishers.co.za (31 Jan. 2010)

(www.ru.ac.za)

a. No
b. Yes
c. Don't know

A shortened version of an assignment was added to demonstrate synthesis.

Figure E.52: Question 30 pre- and post-test content validity
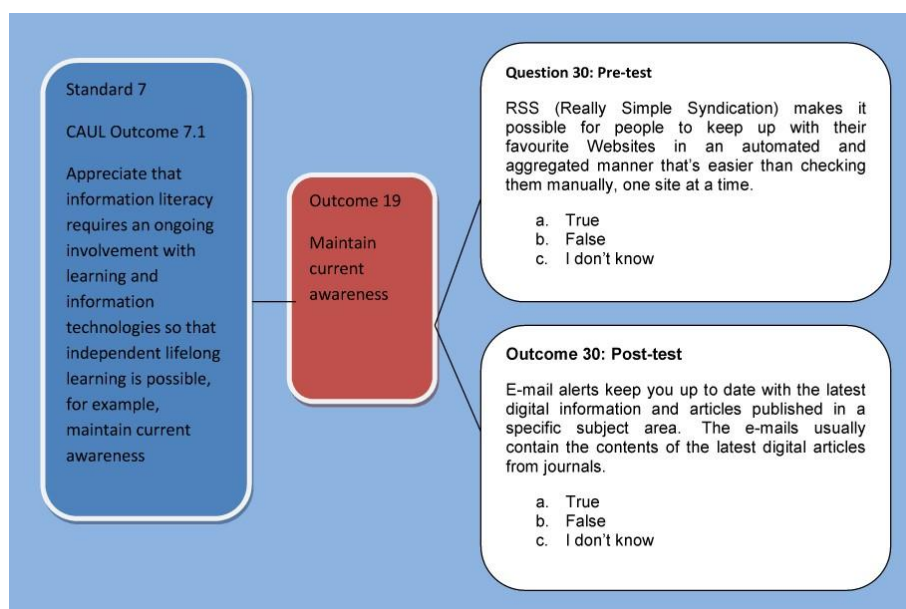
Although the question mapped to the outcome, the question was changed and merged with Question 31, as the literacy experts suggested changing the options to the multiple-choice kind, instead of the True/False/I don't know, which will allow for a better determination of the students' understanding of current awareness services and keeping up to date with digital information technologies (see Figure E.54: Changed and merged question 30 pre- and post-test).

Figure E.53: Question 31 pre- and post-test content validity
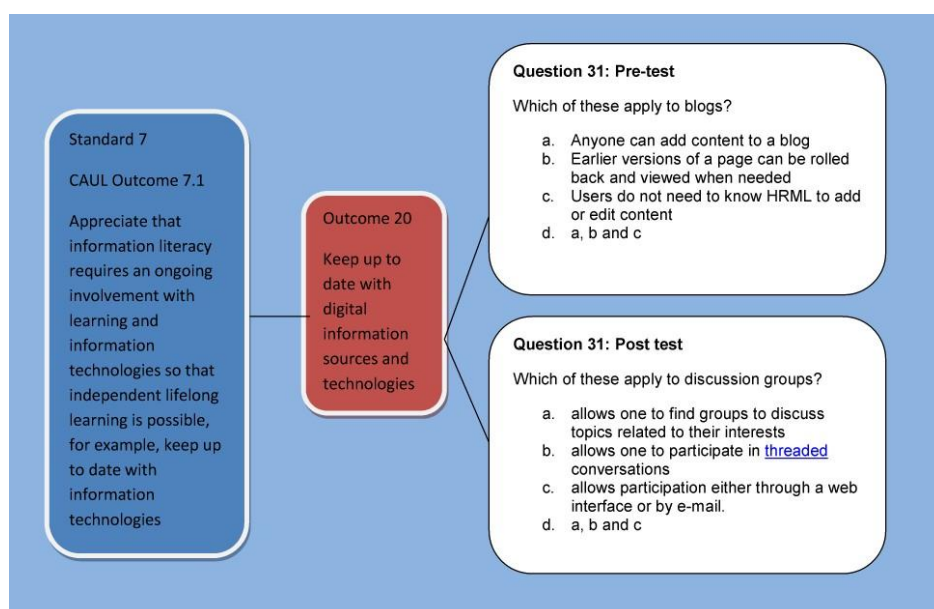
Although the question mapped to the outcome, the question was changed and merged with

Question 30, as the literacy experts suggested changing the options to the multiple-choice kind, instead of the True/False/I don't know, which will allow for a better determination of the students' understanding of current awareness services and keeping up to date with digital information technologies (see Figure E.54: Changed and merged question 30 pre- and post-test).

Figure E.54: Changed and merged question 30 pre- and post-test
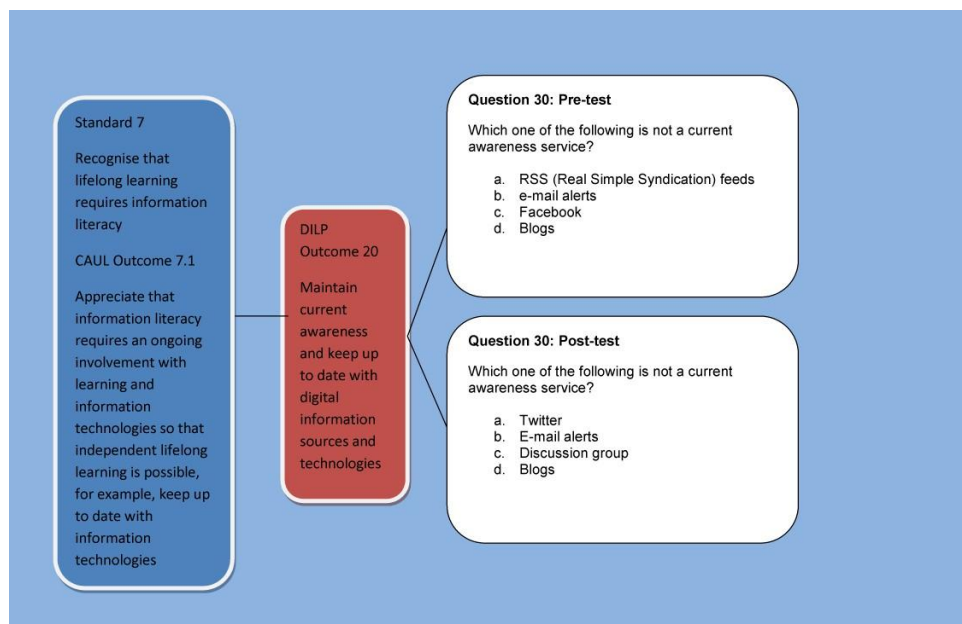
Changed and merged pre- and post-test question with multiple-choice options instead of the True/False/I don't know, which will allow for a better determination of the students' understanding of current awareness services and keeping up to date with digital information technologies.

Digital information literacy pre- and post-quiz and answer and scoring sheets

Digital Information Literacy Pre-Quiz

This quiz will help the researcher to evaluate a digital information literacy program (DILP) which was designed and developed to enhance the digital information literacy skills of students.

All the data that you provide during the study will be handled confidentially.

REMEMBER this is a quiz and you will NOT be rated. HAVE FUN!!

Your co-operation is highly appreciated.

Instructions:

- o Read the items **carefully** and if you think that more than one answer might be correct, **always select the BEST answer.**
- o Circle only **one** answer.
- o Most of the questions would only require you to circle **one** answer except for Question 6, 18 and 27.
- o Question 12 would require you to write one example.

Please complete the following about yourself:

Name   _____   Surname   _____

Student number_____   Course name   _____

Age   _____

1. We need information when we want to

   a. revise our diet
   b. plan a holiday
   c. write an assignment
   d. a, b and c

2. You have to write an assignment on a topic about which you know very little. What will you do to get started?

   a. Browse the online catalogue of the library for books on your topic
   b. Search the Internet
   c. Find out some basics on your topic from an online reference source such as a digital encyclopaedia
   d. a, b and c

3. Before searching for information on a topic for your assignment, such as "violence in

South African high schools", you would first

a. decide which Web sites are appropriate for the search
b. divide the topic into concepts or terms
c. know which aspects of the topic are most important
d. b and c

4. Which of these provide a narrower version of the following topic: "violence in South African high schools" ?

a. Violence in high schools in the Western Cape
b. Violence in schools in South Africa
c. Destructive behaviour in high schools
d. Don't know

5. The best way to find information for your assignment is to start by exploring general digital information sources such as

a. Wikipedia
b. Encyclopedia.com
c. Encyclopedia Britannica
d. a, b, and c

6. For each information category on the left, circle the **number** of the ONE best source to use to find the information:

Digital source→ Information↓	Magazine (e.g. Drum)	Journal (e.g Journal of Medical Research)	Book (e.g. Anatomy of the Human Body)	Encyclopaedia (e.g. Wikipedia)	Don't know
a. Current research on	1	2	3	4	5

HIV/AIDS					
b. Fashion, diet tips and celebrity information	1	2	3	4	5
c. Description of the Ndebele culture	1	2	3	4	5
d. Detailed information about the humerus (arm bone)	1	2	3	4	5

7. The World Wide Web (WWW) offers us various *tools* to access digital information. Which one would be best suited to find the Web address for an institution?

   a. Electronic database
   b. Search engine
   c. Hyperlink
   d. Don't know

8. Some search engines organises pre-selected Web sites into subject areas and allow users to click through a menu to find information on their topic. Which one is the most appropriate to use then when you are searching for universities in South Africa?

   a. Bing
   b. Ananzi
   c. Dogpile
   d. None of the above

9. To search for information on "Xenophobic attacks affecting refugees and asylum-seekers in South Africa", which digital information access tool would be the most appropriate choice?

    a. Search engine
    b. Browser
    c. Full-text database
    d. Don't know

10. Digital information such as journal articles can be retrieved from databases. Which statement/s about databases is true?

    a. Databases allow you to search for full-text articles
    b. Databases allow you to search for bibliographic references to articles
    c. Full-text articles can be downloaded in .html or PDF formats
    d. All the statements are true

11. Which of the following search strategies will get the best information when searching a database on the following topic?

        "Discuss capital punishment as a deterrent to crime"

    Circle the one you think is the best search strategy to start with.

    a. capital punishment OR crime
    b. deterrent AND crime AND capital punishment
    c. capital punishment AND crime
    d. punishment AND crime

12. Phrase searching allows you to combine words so that you only get records where the words are next the words are *next to each other in the order specified*. Most databases and search engines use quotation marks (" ") to designate a phrase. Give an example of a phrase search that you might use in searching for information on the following topic:

Tourism management in South Africa

_____

13. Which criteria should you use to evaluate whether or not a particular source is valuable for using in your assignment?

   a. expert author, reliable information, up-to-date, objective
   b. famous author, high Internet search engine ranking, short, up-to-date
   c. famous author, up-to-date, easy to find, large quantity of information
   d. easy to read, Internet availability, visual aids (diagrams, photos) objective

14. When would you use an article located on the Internet for writing your assignment?

   a. The article is written by an individual with a Ph.D.
   b. The article is available from a Web site ending in .edu
   e. The article is available, free-of-charge, from a directory such as Open Access Journals
   c. a, b and c

15. When evaluating sources of digital information, the *date* of the source is only important in dealing with medical research

   a. True
   b. False
   c. Don't know

16. If you find a Web page, what would be your best clue as to whether the page is a reliable source to use in writing your assignment?

   a. finding out which institution is hosting the Web page

b. date of the last update of the page

c. the quality of the page's graphic design

d. a, b and c

17. Which of the following is the best way to determine if the content of a Web page is accurate?

a. check the information against information from sources that rate sites

b. ask a friend

c. e-mail the author of the Web page

d. assume the information is incorrect

18. For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension.

a. ____.jpg   1. Music/Audio

b. ____.wav   2. Movie

c. ____.avi   3. Image

d. ____.gif   4. Graphic

19. How do you create a folder to store your images, sounds, videos and text?

a. click on My Documents, File, New, Folder and give it a name

b. highlight a Folder in My Documents and use the arrow key to move the image or sound over

c. highlight the image and drag and drop it into the Folder

d. highlight the video and copy and paste it into the Folder

20. Once you've found the digital information on the Web, you can capture (store) the information. Which of the following would work to capture the information?

a. copy and paste

b. file and save as …

c. print

d. a, b and c

21. Computer viruses can be stopped from spreading on your computer by downloading anti-virus software.

    a. True
    b. False
    c. Don't know

22. Digital storytelling is the practice of using computer-based tools to tell stories. Digital stories contain a mixture of only computer-based images and text.

    a. True
    b. False
    c. Don't know

23. Companies prevent people from using fee-based information by providing login codes and passwords; users pay ''per-use'' of the digital information or users pay a subscription fee.

    a. True
    b. False
    c. Don't know

24. Copyright protection covers works that represent an original idea, in any format (text, music, pictures and video). What can you then print or copy to use in your assignments?

    a. One article per issue of a journal
    b. Pictures, animations, graphics and diagrammes
    c. 10% of digital sources (e.g. a Web site) if it is not divided into chapters (e.g digital books)
    d. a, b and c.

25. You want to use some of the information found in an online journal article for your assignment. Which situation requires that you cite the source of your information to prevent plagiarism?

    a. When you copy a whole paragraph and indents the paragraph
    b. When you paraphrase a main point in your own words

c. When you quote a sentence (using quotation marks)

d. a, b and c

26. Take a look at the paragraph below. Assuming that you need to add some of this information into the assignment you are writing, please select from the citations (a-d) the correct way to cite the source (Remember we are using the Harvard Referencing style)

> Original passage: (Copyright © The Nobel Foundation 1993
> http://nobelprize.org/nobel_prizes/peace/laureates/1993/mandela-bio.html)

Nelson Mandela was released on February 11, 1990. After his release, he plunged himself wholeheartedly into his life's work, striving to attain the goals he and others had set out almost four decades earlier.
In 1991, at the first national conference of the ANC held inside South Africa after the organization had been banned in 1960, Mandela was elected President of the ANC while his lifelong friend and colleague, Oliver Tambo, became the organisation's National Chairperson.

a. According to the Nobel Foundation (1993) Nelson Mandela was released on 11 February 1990.

b. Nelson Mandela was released on February 11, 1990 (The Nobel Foundation, 1993)

c. Nelson Mandela was released on the 11th of February in 1990 (The Foundation)

d. a and b

27. Below are four references for different types of digital information sources. Match the numbered items in the gray box area to each reference by writing the correct number next to the reference you think it belongs to.

> 1. Book on the Internet
> 2. Periodical/journal/magazine article
> 3. Home page
> 4. Government publication

a. ___ South African Revenue Service. 2009. *Income tax* [online].
   Available on the Internet at: http://www.sars.gov.za (30 November 2009).

b. ___ African National Congress. 2009. *How to join the ANC* [online].
   Available on the Internet at: http://www.anc.org.za (1 December 2009).

c. ___ Mandela, M. 2001. Mandela on tour with ISES.
   Refocus [online], 2(7), Sept.:50-52. Available on the Internet at:
   http://www.sciencedirect.com (28 June 2010).

d. ___ Graig, W.J. (ed.). 2000. *The Oxford Shakespeare* [online].
   Available on the Internet at: http://www.bartleby.com (2 July 2010).

28. Organising what you have found will help you to understand the digital information. One way of organising your digital information is to create an outline. An outline arranges information by identifying main headings, subheadings and details under the subheadings. Which one of the following figures do you think represents the best way of organising vegetarianism?
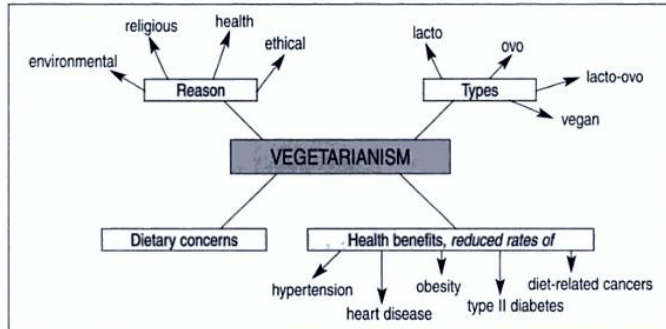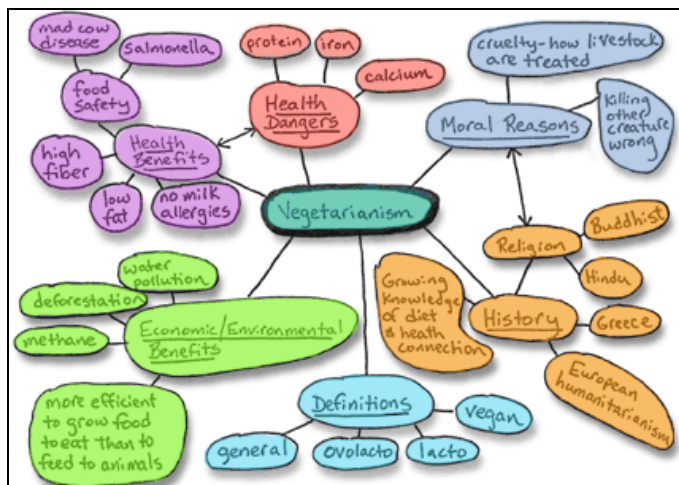
a. Figure 1
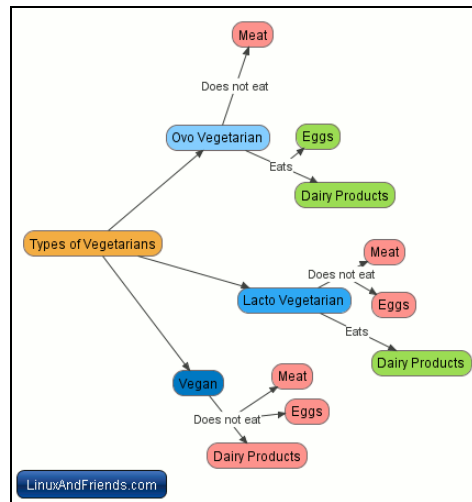
b. Figure 2

c.   Figure 3

d.   a, b and c

a.   Figure 1
b.   Figure 2
c.   Figure 3
d.   a, b and c

29. The process of integrating your information from the digital sources you have gathered, and then
    creating your own information product (an assignment), is called synthesising. Do you think the
    following is a good example of what an assignment should look like?
    (Considering that this is a shortened version of an assignment)

J.S. MOEKOENA

STUDENT NUMBER: 9603447

ND: CLINICAL THERAPY

TABLE OF CONTENTS

1. Introduction
2. Pet therapy and the elderly
3. Projects in Cape Town
4. Conclusion

CLINICAL THERAPY II	5. Bibliography
PET THERAPY	
Lecturer: Mrs M. Mothobi	
Date: 24 March 2010	

PET THERAPY

1.Introduction

Therapy means the treatment of physical or mental disorders by non-surgical methods; for example occupational therapy, physiotherapy or psychotherapy. In pet therapy the special qualities that pets have are exploited to help people with problems. Pet therapy is used with, inter alia, disturbed children and handicapped people.

2. Pet therapy and the elderly

Old people living in South Africa today have specific problems. Research shows that x% live on incomes of less than R200 per month; y% have no contact with their families; z% depend on church support groups for food and clothing (Human Sciences Research Council, 1994:78-79)

It is perhaps this last quality that makes them so potentially therapeutic for old people. As Yvonne Carmen (1994:58) points out, they give comfort and solace to lonely residents of old-age homes.

3. Projects in Cape Town

This proved very successful. Measures of emotional well-being showed that regular contact with pets benefitted the residents of two old-age homes in Lansdowne and Bellville.

4.Conclusion

These projects prove the value of pet therapy for old people. The great advantage of pet therapy is its relatively low cost. The needs of the elderly are huge but resources are small. Volunteers can be used in pet therapy programmes as no specialised training is needed.

5.Bibliography

BEHR, J.A. 1993. Pet therapy and the elderly: a case study. *Compos mentis*, [online], 10 (3):45-49. Available at: http://www.cp.ac.za (7 Jan. 2010).

CARMEN, Yvonne. 1994. *Along came a dog* [online]. Available at:
http://www.edwardarnold.co.uk (1 Feb. 2010)

HUMAN SCIENCES RESEARCH COUNCIL. 1994. *Report on the living standards of the elderly*

Pet therapy in Cape Town began in an experimental way in 1992 as a project of the XXX (Behr, 1993:45).	*in South Africa* [online]. Available at: http://www.hsrc.org.za (2 Mar.2010).

a. No
b. Yes
c. Don't know

30. Which one of the following is not a current awareness service?

a. RSS (Real Simple Syndication) feeds
b. e-mail alerts
c. Facebook
d. Blogs

Digital information literacy pre-test (quiz): Answer key and scoring sheet

Scorer_____ Student number_____ Score_____

Quiz item	Correct answer	Points Possible	Points awarded
1.	d.	1	
2.	d.	1	
3.	d.	1	
4.	a.	1	
5.	d.	1	
6.	a. = 2 b. = 1 c. = 4 d. = 3	4	
7.	b.	1	
8.	b.	1	
9.	a.	1	
10.	d.	1	
11.	c.	1	
12.	Any one of the following "tourism management" or "south africa"	1	
13.	a.	1	
14.	c.	1	
15.	b.	1	
16.	d.	1	
17.	a.	1	
18.	a. = 3 b. = 1 c. = 2 d. = 4	4	
19.	a.	1	
20.	d.	1	
21.	a.	1	
22.	b.	1	

23.	a.	1	
24.	d.	1	
25.	d.	1	
26.	d.	1	
27.	a. = 4 b. = 3 c. = 2 d. = 1	4	
28.	d.	1	
29.	b.	1	
30.	c.	1	
		Total: 39	**Total**

Digital Information Literacy Post-Quiz

This quiz will help the researcher to evaluate a digital information literacy program (DILP) which was designed and developed to enhance the digital information literacy skills of students.

All the data that you provide during the study will be handled confidentially.

REMEMBER this is a quiz and you will NOT be rated. HAVE FUN!!

Your co-operation is highly appreciated.

Instructions:

- o Read the items **carefully** and if you think that more than one answer might be correct, **always select the BEST answer.**
- o Circle only **one** answer.
- o Most of the questions require you to circle **one** answer except for Question 6, 18 and 27.
- o Question 12 requires you to write one example.

1. We need information when we want to

   a. Revise our exercise routine
   b. Plan a long weekend
   c. Write an assignment
   d. a, b and c

2. You have to write an assignment on a topic about which you know very little. What do you do to get started?

   a. Search for the topic in the library's online catalogue
   b. Type the topic in a Web search engine such as Google
   c. Find some basics on your topic from a digital/online information source such as a subject specific encyclopaedia

      d. a, b and c

3. Before searching for information on the topic of your assignment, such as "the economic impact of the 2010 World Cup", you should first

      a. Decide which Web sites are appropriate for the search
      b. Divide the topic into concepts or terms
      c. Know which aspects of the topic are most important
      d. b and c

4. Which of these provide a narrower version of the following topic: "the economic impact of the 2010 World Cup"?

      a. Economic impact of the 2010 World Cup in Gauteng
      b. The economics of the last 20 years of the World Cup
      c. The economics of football in South Africa
      d. Don't know

5. The best way to find information for your assignment is to start by exploring general digital information sources such as

      a. Encyclopaedia Britannica
      b. UNIWIKI
      c. Encyclopedia.com
      d. a, b, and c

6. For each information category on the left, circle the number of the best source to use to find the information:

Digital source→ / Information↓	Magazine (e.g. Drum)	Journal (e.g Journal of Medical Research)	Book (e.g. Anatomy of the Human Body)	Encyclopaedia (e.g. Wikipedia)	Don't know
a. Current research on TB (*Tuberculosis*)	1	2	3	4	5
b. Exercise and lifestyle tips as well as TV programs	1	2	3	4	5
c. Description of the Tswana culture	1	2	3	4	5
d. Detailed information about the femur (thigh bone)	1	2	3	4	5

7. The World Wide Web (WWW) offers us various *tools* to access digital information sources. Which tool would be best suited to find articles about "Generic drugs for treatment of brain cancer"?

    a. Hyperlink
    b. Search engines
    c. Electronic databases
    d. Don't know

8. "Live" type of search engines indexes billions of Web pages, so that users can search for the information they desire, through the use of <u>keywords</u>. Which one is the most appropriate to use when you are searching for "Research methods"?

    a. Metacrawler

b. Yahoo!

c. Google

d. None of the above

9. To search for information on "*ANCYL (African National Congress Youth League) called for the nationalisation of mines in South Africa*", which digital information access tool would be the most appropriate choice?

a. Search engine

b. Browser

c. Bibliographic database

d. Don't know

10. Digital information such as journal articles can be retrieved from databases.
    Which statement about databases is true?

a. Databases allow you to search for specific authors of journal articles

b. Databases allow you to search for specific titles of journal articles

c. Full-text articles can be saved in .html or PDF formats

d. All the statements are true

11. Which of the following search strategies will get the best information when searching a database on the following topic?

"Describe the characteristics of an asthma or hay fever attack"

Circle the one you think is the best search strategy to start with.

a. asthma OR hay fever

b. (asthma OR hay fever) AND characteristics

c. asthma AND hay fever

d. characteristics AND attack

12. Phrase searching allows you to combine words so that you only get records where the words are *next to each other in the order specified*. Most databases and search engines use quotation marks (" ") to designate a phrase. Give an example of a phrase search that you might use in searching for information on the following topic:

Adolescent drug use in high schools

_____

13. Which criteria should you use to evaluate whether or not a particular source is valuable for using in your assignment?

   a. Reputable author, trustworthy information, current, un-biased
   b. Well-known author, high Internet search engine ranking, concise, current
   c. Well-known author, current, not difficult to find, a lot of information
   d. Not difficult to read, accessible on the Internet, audiovisual aids (for example, video clips), un-biased

14. When would you use an article located on the Internet for writing your assignment?

   a. The article is written by a well-known scholar in the field
   b. The article is available from a Web site connected to a university
   c. The article is available, free-of-charge, from a directory such as Open Access Journals
   d. a, b and c

15. When evaluating sources of digital information, the date of the source is important depending on the topic

   a. True
   b. False
   c. Don't know

16. If you find a Web page, what would be your best clue as to whether the page is a reliable source to

use in writing your assignment?

     a. The URL (e.g. http://www.tut.ac.za)
     b. The links the page has
     c. The layout, font and pictures used on the Web page
     d. a, b and c

17. Which of the following is the best way to determine if the content of a Web page is accurate?

     a. Make sure author provides e-mail or a contact address/phone number.
     b. Know the distinction between author and webmaster
     c. Make sure the information is error-free
     d. a, b and c

18. For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension.

a.___.gif	1. Music/Audio
b.___.MP3	2. Movie
c.___.MPEG	3. Graphic
d. ___.jpg	4. Image

19. How do you create a system to store your images, sounds, videos and text?

     a. Click on My Documents, File, New, Folder and give it a name
     b. Restrict folders to a single document type e.g. pictures in one folder
     c. Organise related information in separate folders
     d. a, b and c

20. Once you've found the digital information on the Web, you can capture (store) the information. Which of the following would work to capture the information?

     a. Copy and paste

b. Save as type .html

c. Make a screen shot, paste in a Word document

d. a, b and c

21. "A computer virus is a term used to describe malicious programs that install themselves onto a computer. Viruses will cause a range of damage, from the very mild to the entire loss of computer data" (adapted from Gil, 2009)

a. True

b. False

c. Don't know

22. Digital storytelling is the practice of using computer-based tools to tell stories. Digital stories contain a mixture of only computer-based text and video clips.

a. True

b. False

c. Don't know

23. Databases containing journal articles usually require a login code and password because it does not allow free access to all Web users.

a. True

b. False

c. Don't know

24. Copyright protects original works of authorship in any format (text, music, pictures and video). What can you print or copy to use in your assignments?

a. From a journal, not more than one article per issue

b. Graphics, video, sound and diagrammes

c. 10% of a Web site

d. a, b and c.

25. You want to use some of the information found in an online journal article for your assignment.

Which situation requires that you cite the source of your information to prevent plagiarism?

a. The source was quoted word for word, using quotation marks
b. Only an idea was used in you assignment, the words were changed
c. You've copy and pasted 1 sentence from a Web site into your assignment
d. a, b and c

26. Take a look at the paragraph below. Assuming that you need to add some of this information into the assignment you are writing, please select from the citations (a-d) the correct way to cite the source (Remember we are using the Harvard Referencing style).

Original passage: (Copyright © South African History Online, 2009, http://www.sahistory.org.za)

Winnie Madikizela: She completed her degree in social work in 1955, and was offered a scholarship for further study in the USA. However she turned it down and opted for a challenging position as the first qualified Black medical social worker at the Baragwanath Hospital in Johannesburg instead.

a. Winnie Madikizela completed her degree in social work in 1955 (South African History Online)
b. According to South African History Online (2009) Winnie Madikizela completed her social work degree in 1955
c. Winnie Madikizela completed her degree in social work in 1955
d. Winnie Madikizela was offered a scholarship for further study in the USA (2009)

27. Below are four references for different types of digital information sources. Match the numbered items in the gray box area to each reference by writing the correct number next to the reference you think it belongs to.

> 1. Book on the Internet
> 2. Periodical/journal/magazine article
> 3. Home page
> 4. Government publication

a. ___ South African Revenue Service. 2009. *Customs* [online].

Available on the Internet at: http://www.sars.gov.za (30 November 2009).

b. ___ African National Congress. 2009. *Donate to the ANC* [online].

Available on the Internet at: http://www.anc.org.za (1 December 2009).

c. ___ Baleta, A. 2002. Confusion over Mandela's "support" of ANC HIV policy

The Lancet [online], 359(9309), 9 March:855.

Available on the Internet at: http://www.sciencedirect.com (3 December 2009).

d. ___ Gray, H. 2009*. Anatomy of the human body* [online].

Available on the Internet at: http://www.bartleby.com (2 December 2009).

28. Organising what you have found will help you to better understand the digital information. One way of organising your digital information is to create an outline. An outline arranges information by identifying main headings, subheadings and details under the subheadings. Which one of the following figures do you think represents the best way of organising information on general health?

    a. Figure 1

    b. Figure 2

c. Figure 3

(http://www.thinkbuzan.com/intl/support/mindmapgallery)
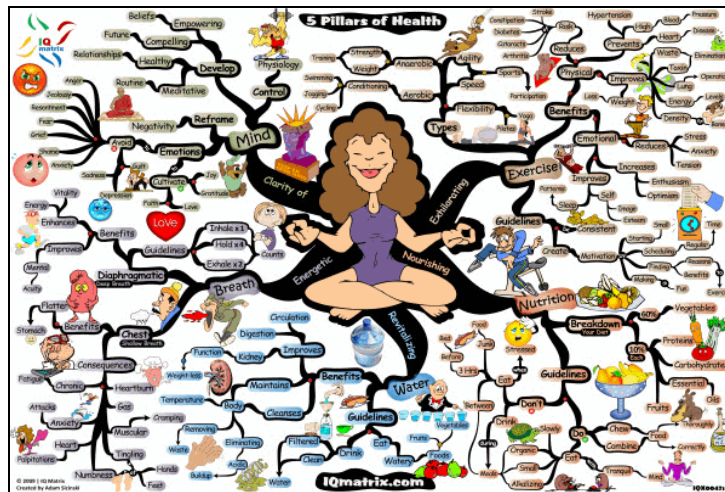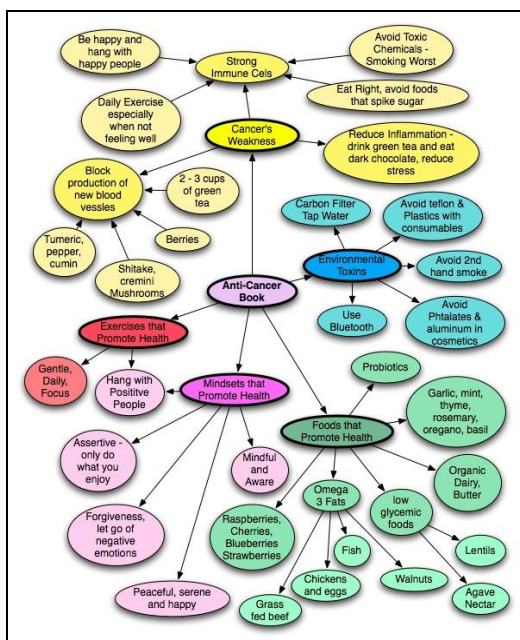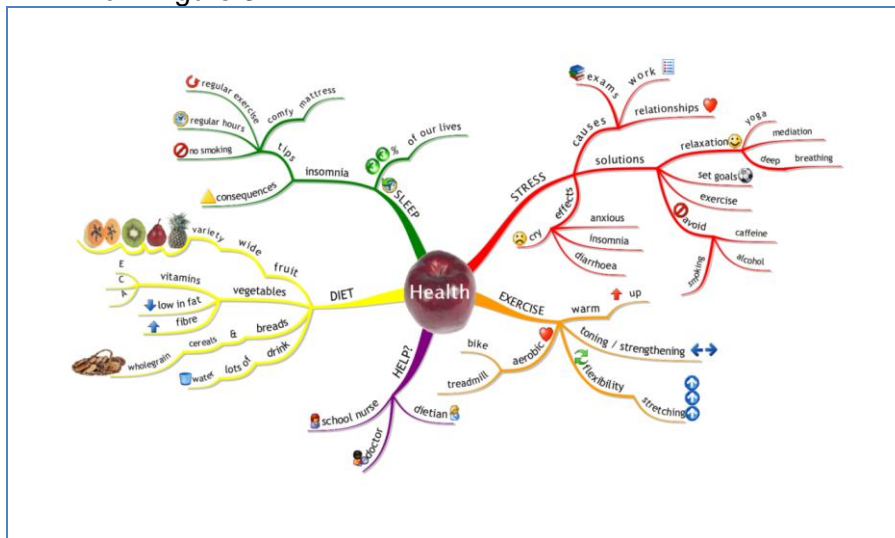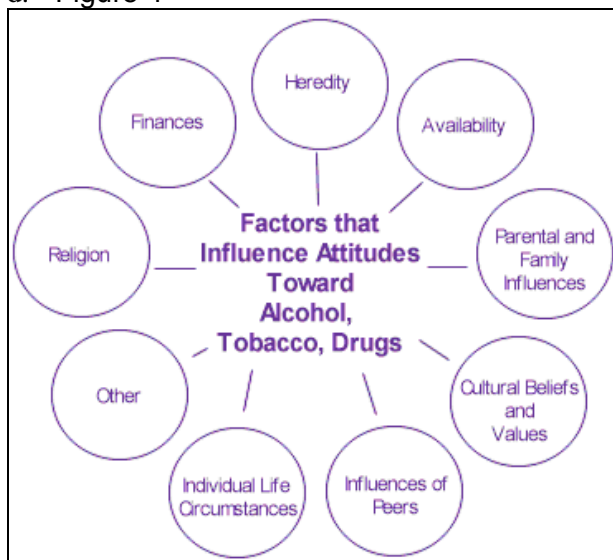
d. Figure 4

a. Figure 1
b. Figure 2

c. Figure 3

d. Figure 4

29. The process of integrating your information from the digital sources you have gathered, and then creating your own information product (an assignment), is called synthesising.
Do you think the following is a good example of what an assignment should look like, considering that this is a shortened version of an assignment?

ND: MANAGEMENT

Human Resource Management II

MANAGING ABSENTEEISM

Lecturer: Mrs B Mokoena

Date: 1 March 2009

Name: Ms CZ Mbilini

Student number: 9603447

TABLE OF CONTENTS

1. Introduction

Absenteeism is a costly and disruptive problem and places unnecessary pressure on staff that are at work. Until they investigate, companies normally do not realize the cost of absenteeism until they actually measure it.

2. Reasons for absenteeism

According to Van der Merwe (1988:7-8) the reasons for absenteeism can be devided in three categories, namely personal factors, rganisational factors and attitudinal factors. Markowich (1996:116) states that some employees have the mentality that the "time is due to me - whether I'm sick or not", or see

4. Conclusion

What became clear in this study was that it is extremely important for staff to see that absenteeism would not be tolerated, otherwise it would lead to worsening absenteeism and a host of other negative effects on the workers and on the organisation. The sooner management and supervisors act on absenteeism, the better for the department, organisation and the employees.

5. Bibliography

Markowich, M M. Eckberg, S. 1996. Get control of the absentee-minded*. Personnel Journal* [online], 115-120, December. Available at:

sick leave as "use-or-lose benefits".

3. Effects of absenteeism

Absenteeism has many devastating effects on organisations all around the world. Perry (1997:9) states that: "The real cost of chronic absenteeism then is lowered morale among other employees who must should the work load and lost revenue"

http://www.jp.ac.ru (1 Feb. 2010)

Perry, P M. 1997. Confronting the no-show. *American Nurseryman* [online], 185:89-95, January 15. Available at http://www.americannurse.com (7 Feb. 2010)

Van der Merwe, R. Miller, S. 1988. *Measuring absence and labour turnover [online].* Available at: http://www.lexiconpublishers.co.za (31 Jan. 2010)

a. No
b. Yes
c. Don't know

30. Which one of the following is not a current awareness service?

a. Twitter
b. E-mail alerts
c. Discussion group
d. Blogs

Digital information literacy post-test (quiz): Answer key and scoring sheet

Scorer_____ Student number_____ Score_____

Quiz item	Correct answer	Points Possible	Points awarded
1.	d.	1	
2.	d.	1	
3.	d.	1	
4.	a.	1	
5.	d.	1	
6.	a. = 2 b. = 1 c. = 4 d. = 3	4	
7.	c.	1	
8.	c.	1	
9.	a.	1	
10.	d.	1	
11.	b.	1	
12.	Any one of the following "adolescent drug use" or "high schools" or "drug use"	1	
13.	a.	1	
14.	d.	1	
15.	a.	1	
16.	d.	1	
17.	d.	1	
18.	a. = 3 b.= 1 c.= 2 d.= 4	4	
19.	d.	1	
20.	d.	1	
21.	a.	1	

22.	b.	1	
23.	a.	1	
24.	d.	1	
25.	d.	1	
26.	b.	1	
27.	a. = 4 b. = 3 c.= 2 d. = 1	4	
28.	c.	1	
29.	b.	1	
30.	c.	1	
		Total: 39	**Total**

School of Arts, Education,

Languages and Communications

Information Science

INFORMATION LEAFLET AND INFORMED CONSENT

PROJECT TITLE: EVALUATION OF A DIGITAL INFORMATION LITERACY PROGRAM

Primary investigator: Mrs A Sieberhagen, MTech (Library and Information Studies)

Study leader: Dr Linda Cloete, DPhil (Library and Information Science), Consultant: Courseware Development; External Promoter: Department of Information Science, Unisa

Dear Research participant,

You are invited to participate in a research study that forms part of my formal D.Litt et Phil in Information Studies. This information leaflet will help you to decide if you would like to participate. Before you agree to take part, you should fully understand what is involved. You should not agree to take part unless you are completely satisfied with all aspects of the study.

WHAT IS THE STUDY ALL ABOUT?

A digital information literacy program (DILP) was designed and developed as part of the

researcher's MTech studies in Library and Information Science and should **enhance your digital information literacy skills**. This program will assist you in

- using various digital information sources, for example, online databases, online books, online newspapers, search engines, etc.
- carrying out effective searches
- organising your digital data
- helping you cite to avoid plagiarism
- using a bibliographic reference style
- keeping up to date with digital information sources and technologies

It is important for us to **evaluate the program** in order to determine how effective the **program** is in improving digital information literacy skills and to show how the program might be improved to be more effective.

WHAT WILL YOU BE REQUIRED TO DO IN THE STUDY?

If you decide to take part in the study, you will be required to do the following:

- To sign an informed consent form.

- To complete a digital information literacy quiz (please note, this is NOT a test, it is like a questionnaire and **YOU will NOT be rated**). You will be asked to respond to questions regarding the way digital information is accessed, evaluated and used. You will complete the questionnaire in a computer lab on campus. It should not take more than 30 minutes to complete this.

- To work through the program (DILP) in one of the computer labs on campus. It should take about an hour to do this.

- To complete another digital information literacy quiz after you've worked through the program (please note once again, this is NOT a test, it is like a questionnaire and **YOU will NOT be rated**). Once again you will be asked to respond to questions regarding the way digital information is accessed, evaluated and used. You will complete the questionnaire in a computer lab on campus. It should also not take more than 30 minutes to complete this.

- All of this should not take more than 2 hours to complete and this is a once-off contact

session.

- The researcher would then also like to do follow-up interviews, **but only** in the case where the DILP failed to enhance certain digital information literacy skills. You will be contacted *via* your telephone or e-mail address. A short number of questions regarding the DILP will then be asked. This should take about 10 minutes.

ARE THERE ANY CONDITIONS THAT MAY EXCLUDE YOU FROM THE STUDY?

You are eligible to participate in this study if you are currently 32 years old or younger.

CAN ANY OF THE STUDY PROCEDURES RESULT IN PERSONAL RISK, DISCOMFORT OR INCONVENIENCE?

Questionnaire: The study and procedures involve no foreseeable physical or emotional discomfort or inconvenience to you. The questions in the quizzes are not of personal nature and you should not experience any emotional of physical discomfort.

Working through the DILP (the program): Working through the program will not involve any foreseeable physical or emotional discomfort or inconvenience to you. The content of the DILP are not of personal nature and you should not experience any emotional of physical discomfort.

Follow-up interviews: The follow-up interview will not involve any foreseeable physical or emotional discomfort to you. The questions asked will not be of personal nature.

WHAT ARE THE POTENTIAL BENEFITS THAT MAY COME FROM THE STUDY?

The benefits of participating in this study are:

- You should be able to define and refine assignment topics, select the most appropriate information sources for finding required information, construct and carry out an effective digital search strategy, evaluate the quality of a digital information source, understand plagiarism and copyright; and learn how to use a citation and bibliographic reference style.

- You will make a contribution towards validating the DILP as a learning tool.

- You will make a contribution towards determining the effectiveness of the program.

WILL YOU RECEIVE ANY FINANCIAL COMPENSATION OR INCENTIVE FOR PARTICIPATING IN THE STUDY?

You will not be financially compensated for participation in the study, however, you will receive refreshments after completion of the quizzes and working through the program and receive your own personal copy of the Digital Information Literacy Program on CD.

WHAT ARE YOUR RIGHTS AS A PARTICIPANT IN THIS STUDY?

Your participation in this study is entirely voluntary. Please note that your participation or non-participation in this research project will have no bearing whatsoever on any academic assessment, evaluation or outcome linked to your course of study.

You have the right to withdraw at any stage without any penalty or future disadvantage whatsoever. You don't even have to provide the reason/s for your decision. Your withdrawal will in no way influence your studies at TUT.

HOW WILL CONFIDENTIALITY AND ANONYMITY BE ENSURED IN THE STUDY?

All the data that you provide during the study will be handled confidentially. This means that access to your data will be strictly limited to the researcher. Also, your data and personal information will be kept and stored in a confidential format which will only be accessible to the researcher.

IS THE RESEARCHER QUALIFIED TO CARRY OUT THE STUDY?

The researcher is an adequately trained and qualified librarian in the study fields covered by this research project, specifically in digital information literacy. Also, she is an accredited facilitator, moderator and assessor and is registered with the Education, Training and Development (ETDP)-Seta.

HAS THE STUDY RECEIVED ETHICAL APPROVAL?

Yes. The Research Ethics Committee of the Tshwane University of Technology have approved the formal study proposal. Also, the Management of the Nelspruit campus of TUT has granted approval for the study. All parts of the study will be conducted according to internationally accepted ethical principles.

WHO CAN YOU CONTACT FOR ADDITIONAL INFORMATION REGARDING THE STUDY?

The primary investigator, Mrs A Sieberhagen, can be contacted during office hours at Tel (021) 590-5894, or on her cellular phone at 083 581-7789. The study leader, Dr L Cloete, can be contacted during office hours at Tel (011) 475-4937. Should you have any questions regarding the ethical aspects of the study, you can contact the chairperson of the TUT Research Ethics Committee, Dr WA Hoffmann, during office hours at Tel (012) 382-6265/46.

DECLARATION: CONFLICT OF INTEREST

Not applicable

A FINAL WORD

Your co-operation and participation in the study will be greatly appreciated. Please sign the underneath informed consent if you agree to participate in the study. In such a case, you will receive a copy of the signed informed consent from the researcher.

CONSENT

I hereby confirm that I have been adequately informed by the researcher about the nature, conduct, benefits and risks of the study. I have also received, read and understood the above written information. I am aware that the results of the study will be anonymously processed into a research report. I understand that my participation is voluntary and that I may, at any stage, without prejudice, withdraw my consent and participation in the study. I had sufficient opportunity to ask questions and of my own free will declare myself prepared to participate in the study.

Research participant's name: _____ (Please print)

Research participant's signature: _____

Date: _____

Researcher's name: _____ (Please print)

Researcher's signature: _____

Date: _____

VERBAL CONSENT

(Applicable when participants cannot read or write)

I hereby declare that I have read and explained the contents of the information sheet to the research participant. The nature and purpose of the study were explained, as well as the possible risks and benefits of the study. The research participant has clearly indicated that he/she will be free to withdraw from the study at any time for any reason and without jeopardizing his/her relationship with the health care team.

I hereby certify that the research participant has verbally agreed to participate in this study.

Research participant's name: _____ (Please print)

Researcher's name: _____ (Please print)

Researcher's signature: _____

Date: _____

Appendix H

Follow-up interview question sheets

Follow-up interview question sheet for Question 2

Dear Student

First of all, the research team for the *Evaluation of the Digital Information Literacy Program* would like to thank you for participating in this very exciting research project. We hope that you've enhanced your digital information literacy skills and can apply them to your studies.

After analysing the quizzes, we decided to do a follow–up interview about some of the questions and the program itself.

Question 1: If you think back to **Question 2** (see scroll down to see the questions again) in the pre- and post-quiz and the program (DILP) itself, **what are the possible problems and / or misunderstandings that students could have experienced with the question?**

Question 2: What did you like about the program?

Question 3: How can the program be improved?

Please provide us with any additional comments.

Here are the questions again if you can't remember:

Question 2: You have to write an assignment on a topic about which you know very little. What do you do to get started?	
Pre-quiz	Post-quiz
a. Browse the online catalogue of the library for books on your topic b. Search the Internet c. Find out some basics on your topic from an online reference source such as a digital encyclopaedia d. a, b and c	a. Search for the topic in the library's online catalogue b. Type the topic in a Web search engine such as Google c. Find some basics on your topic from a digital/online information source such as a subject specific encyclopaedia d. a, b an c
The correct answer is d. *a, b and c*	The correct answer is d. *a, b and c*

Once again, thank you for your participation.

Kind regards. Aneé Sieberhagen and the DILP research team

Follow-up interview question sheet for Question 5

Dear Student

First of all, the research team for the *Evaluation of the Digital Information Literacy Program* would like to thank you for participating in this very exciting research project. We hope that you've enhanced your digital information literacy skills and can apply them to your studies.

After analysing the quizzes, we decided to do a follow–up interview about some of the questions and the program itself.

Question 1: If you think back, to **Question 5** (scroll down to see the questions again) in the pre- and post-quiz and the program (DILP) itself, **what are the possible problems and / or misunderstandings that students could have experienced with the question?**

_____

Question 2: What did you like about the program?

_____

Question 3: How can the program be improved?

_____

Please provide us with any additional comments.

_____

_____

Here are the questions again if you can't remember:The best way to find information for your assignment is to start by exploring general digital information sources such as	
Pre-quiz	Post-quiz
a. Wikipedia b. Encyclopedia.com c. Encyclopaedia Britannica d. a, b and c	a. Encyclopaedia Britannica b. UNIWIKI c. Encyclopedia.com d. a, b, and c
The correct answer is d. *a, b and c*	The correct answer is d. *a, b and c*

Follow-up interview question sheet for Question 6b

Dear Student

First of all, the research team for the *Evaluation of the Digital Information Literacy Program* would like to thank you for participating in this very exciting research project. We hope that you've enhanced your digital information literacy skills and can apply them to your studies.

After analysing the quizzes we decided to do a follow–up interview about some of the questions

and the program itself.

Question 1: If you think back, to **Question 6b** (scroll down to see the questions again) in the pre- and post-quiz and the program (DILP) itself, **what are the possible problems and / or misunderstandings that students could have experienced with the question?**

_____

Question 2: What did you like about the program?

_____

Question 3: How can the program be improved?

_____

Please provide us with any additional comments.

_____

 Here are the questions again if you can't remember:

For each information category on the left, circle the number of the best source to use to find the information:											
Pre-quiz						Post-quiz					
Digital source→ Information ↓	Mag azin e (e.g. Dru m)	Journal (e.g Journal of Medical Resear ch)	Book (e.g. Anato my of the Huma n Body)	Encyclopa edia (e.g. Wikipedia)	Do n't kno w	Digital source→ Informatio n↓	Magaz ine (e.g. Drum)	Journal (e.g Journal of Medica l Resear ch)	Book (e.g. Anato my of the Huma n Body)	Encyclopa edia (e.g. Wikipedia)	Do n't kno w

b. Fashion, diet tips and celebrity information	1	2	3	4	5	b. Exercise and lifestyle tips as well as TV programs	1	2	3	4	5
The correct answer is 1. *Magazine*						The correct answer is 1. *Magazine*					

Follow-up interview question sheet for Question 16

Dear Student

First of all, the research team for the *Evaluation of the Digital Information Literacy Program* would like to thank you for participating in this very exciting research project. We hope that you've enhanced your digital information literacy skills and can apply them to your studies.

After analysing the quizzes we decided to do a follow–up interview about some of the questions and the program itself.

Question 1: If you think back, to **Question 16** (scroll down to see the questions again) in the pre- and post-quiz and the program (DILP) itself, **what are the possible problems and / or misunderstandings that students could have experienced with the question?**

_____

Question 2: What did you like about the program?

_____

Question 3: How can the program be improved?

_____

Please provide us with any additional comments.

_____

Here are the questions again if you can't remember:

If you find a Web page, what would be your best clue as to whether the page is a reliable source to use in writing your assignment?	
Pre-quiz	**Post-quiz**
a. Finding out which institution is hosting the Web page b. Date of the last update of the page c. The quality of the page's graphic design d. a, b and c	a. The URL (e.g. http://www.tut.ac.za) b. The links the page has c. The layout, font and pictures used on the Web page d. a, b and c
The correct answer is d. *a, b and c*	The correct answer is d. *a, b and c*

Follow-up interview question sheet for Question 17

Dear Student

First of all, the research team for the *Evaluation of the Digital Information Literacy Program* would like to thank you for participating in this very exciting research project. We hope that you've enhanced your digital information literacy skills and can apply them to your studies.

After analysing the quizzes we decided to do a follow–up interview about some of the questions and the program itself.

Question 1: If you think back, to **Question 17** (scroll down to see the questions again) in the pre- and post-quiz and the program (DILP) itself, **what are the possible problems and / or misunderstandings that students could have experienced with the question?**

_____

Question 2: What did you like about the program?

_____

Question 3: How can the program be improved?

_____

Please provide us with any additional comments.

_____

 Here are the questions again if you can't remember:

Which of the following is the best way to determine if the content of a Web page is accurate?	
Pre-quiz	**Post-quiz**
a. check the information against information from sources that rate sites b. ask a friend c. e-mail the author of the Web page d. assume the information is incorrect	a. Make sure author provides e-mail or a contact address/phone number. b. Know the distinction between author and webmaster c. Make sure the information is error-free d. a, b and c
The correct answer is a. *check the information against information from sources that rate sites.*	The correct answer is d. *a, b and c*

Follow-up interview question sheet for Question 19

Dear Student

First of all, the research team for the *Evaluation of the Digital Information Literacy Program* would like to thank you for participating in this very exciting research project. We hope that you've enhanced your digital information literacy skills and can apply them to your studies.

After analysing the quizzes we decided to do a follow–up interview about some of the questions and the program itself.

Question 1: If you think back, to **Question 19** (scroll down to see the questions again) in the pre- and post-quiz and the program (DILP) itself, **what are the possible problems and / or misunderstandings that students could have experienced with the question?**

_____

Question 2: What did you like about the program?

_____

Question 3: How can the program be improved?

_____

Please provide us with any additional comments.

_____

Here are the questions again if you can't remember:How do you create a folder to store your images, sounds, videos and text?	
Pre-quiz	**Post-quiz**
a. click on My Documents, File, New, Folder and give it a name b. highlight a Folder in My Documents and use the arrow key to move the image or sound over c. highlight the image and drag and drop it into the Folder d. highlight the video and copy and paste it into the Folder	a. click on My Documents, File, New, Folder and give it a name b. restrict folders to a single document type e.g. pictures in one folder c. organise related information in separate folders d. a, b and c
The correct answer is a. _click on My Documents,_	The correct answer is a. _click on My Documents,_

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Follow-up interview question sheet for Question 22

Dear Student

First of all, the research team for the *Evaluation of the Digital Information Literacy Program* would like to thank you for participating in this very exciting research project. We hope that you've enhanced your digital information literacy skills and can apply them to your studies.

After analysing the quizzes we decided to do a follow–up interview about some of the questions and the program itself.

Question 1: If you think back, to **Question 22** (scroll down to see the questions again) in the pre- and post-quiz and the program (DILP) itself, **what are the possible problems and / or misunderstandings that students could have experienced with the question?**

_____

Question 2: What did you like about the program?

_____

Question 3: How can the program be improved?

_____

Please provide us with any additional comments.

_____

 Here are the questions again if you can't remember:

Digital storytelling is the practice of using computer-based tools to tell stories.

Pre-quiz	Post- quiz
Digital stories contain a mixture of only computer-based images and text. a. True b. False c. Don't know The correct answer is b. *False*	Digital stories contain a mixture of only computer-based text and video clips. a. True b. False c. Don't know The correct answer is b. *False*

Follow-up interview question sheet for Question 27c

Dear Student

First of all, the research team for the *Evaluation of the Digital Information Literacy Program* would like to thank you for participating in this very exciting research project. We hope that you've enhanced your digital information literacy skills and can apply them to your studies.

After analysing the quizzes we decided to do a follow–up interview about some of the questions and the program itself.

Question 1: If you think back, to **Question 27c** (scroll down to see the questions again) in the pre- and post-quiz and the program (DILP) itself, **what are the possible problems and / or misunderstandings that students could have experienced with the question?**

_____

Question 2: What did you like about the program?

_____

Question 3: How can the program be improved?

_____

Please provide us with any additional comments.

_____

Here are the questions again if you can't remember:

Below are four references for different types of digital information sources. Match the numbered items in the gray box area to each reference by writing the correct number next to the reference you think it belongs to.

> 1. Book on the Internet
> 2. Periodical/journal/magazine article
> 3. Home page
> 4. Government publication

Pre-quiz	Post-quiz
a. ___ South African Revenue Service. 2009. *Income tax* [online]. Available on the Internet at: http://www.sars.gov.za (30 November 2009).	a. ___South African Revenue Service. 2009. *Customs* [online]. Available on the Internet at: http://www.sars.gov.za (30 November 2009).
b. ___ African National Congress. 2009. *How to join the ANC* [online]. Available on the Internet at: http://www.anc.org.za (1 December 2009).	b. ___ African National Congress. 2009. *Donate to the ANC* [online]. Available on the Internet at: http://www.anc.org.za (1 December 2009).
c. ___ Mandela, M. 2001. Mandela on tour with ISES. *Refocus* [online], 2(7), Sept.:50-52. Available on the Internet at: http://www.sciencedirect.com (28 June 2010).	c. ___ Baleta, A. 2002. Confusion over Mandela's "support" of ANC HIV policy *The Lancet* [online], 359(9309), 9 March:855. Available on the Internet at: http://www.sciencedirect.com (3 December 2009).
d. ___ Graig, W.J. (ed.). 2000. *The Oxford Shakespeare* [online]. Available on the Internet at: http://www.bartleby.com (2 July	d. ___Gray, H. 2009*. Anatomy of the human body* [online]. Available

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2010).	on the Internet at: http://www.bartleby.com (2 December 2009).
The correct answer for c is 2.	The correct answer for c is 2.

Follow-up interview question sheet for Question 27d

Dear Student

First of all, the research team for the *Evaluation of the Digital Information Literacy Program* would like to thank you for participating in this very exciting research project. We hope that you've enhanced your digital information literacy skills and can apply them to your studies.

After analysing the quizzes we decided to do a follow–up interview about some of the questions and the program itself.

Question 1: If you think back, to **Question 27d** (scroll down to see the questions again) in the pre- and post-quiz and the program (DILP) itself, **what are the possible problems and / or misunderstandings that students could have experienced with the question?**

_____

Question 2: What did you like about the program?

_____

Question 3: How can the program be improved?

_____

Please provide us with any additional comments.

_____

Here are the questions again if you can't remember:

Below are four references for different types of digital information sources. Match the numbered items in the gray box area to each reference by writing the correct number next to the reference you think it belongs to.

> 1. Book on the Internet
> 2. Periodical/journal/magazine article
> 3. Home page
> 4. Government publication

Pre-quiz	Post-quiz
a. ___ South African Revenue Service. 2009. *Income tax* [online]. Available on the Internet at: http://www.sars.gov.za (30 November 2009).	a. ___South African Revenue Service. 2009. *Customs* [online]. Available on the Internet at: http://www.sars.gov.za (30 November 2009).
b. ___ African National Congress. 2009. *How to join the ANC* [online]. Available on the Internet at: http://www.anc.org.za (1 December 2009).	b. ___ African National Congress. 2009. *Donate to the ANC* [online]. Available on the Internet at: http://www.anc.org.za (1 December 2009).
c. ___ Mandela, M. 2001. Mandela on tour with ISES. *Refocus* [online], 2(7), Sept.:50-52. Available on the Internet at: http://www.sciencedirect.com (28 June 2010).	c. ___ Baleta, A. 2002. Confusion over Mandela's "support" of ANC HIV policy *The Lancet* [online], 359(9309), 9 March:855. Available on the Internet at: http://www.sciencedirect.com (3 December 2009).
d. ___ Graig, W.J. (ed.). 2000. *The Oxford Shakespeare* [online]. Available on the Internet at: http://www.bartleby.com (2 July 2010).	d. ___Gray, H. 2009*. Anatomy of the human body* [online]. Available on the Internet at: http://www.bartleby.com (2 December 2009).

The correct answer for d is 1.	The correct answer for d is 1.

Appendix I

TUT Research Ethics Committee letter of approval - April 2010

Tshwane University of Technology
We empower people

Research Ethics Committee

June 2, 2010

Ms A Sieberhagen
c/o Dr L Cloete
Department of Information Science
School of Arts, Education, Languages and Communications
UNISA

Dear Ms Sieberhagen,

TITLE	:	"Evaluation of a Digital Information Literacy Program"
INVESTIGATOR	:	SIEBERHAGEN A
PROGRAMME	:	D Litt et Phil: Information Studies, UNISA

The application for permission to distribute questionnaires in respect of the project with the aforementioned title bears reference.

Thank you for addressing the various issues raised in our letter dated April 21, 2010.

The application for permission to distribute the questionnaire in respect of the project entitled **"Evaluation of a Digital Information Literacy Program"** is hereby **approved.**

<u>Note:</u>

The reference number [top right corner of this communiqué] should be clearly indicated on all forms of communication [e.g. Webmail, E-mail messages, letters] with the intended research participants.

Yours sincerely,

WA HOFFMANN (Dr)
Chairperson: Research Ethics Committee
[REC: Sub-Committee/2010/04/Q005]

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Appendix J

Contingency tables

Q1

Crosstabs

		POST_Q1 We need information when we want to		
		0 Incorrect answer	1 Correct answer	Total
PRE_Q1 We need information when we want to	0 Incorrect answer	175	41	216
	1 Correct answer	59	211	270
Total		234	252	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.089[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across We need information when we want to and We need information when we want to are equally likely for the specified categories.	Related-Samples McNemar Test	.089	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q2

Crosstabs

| | | POST_Q2 You have to write an assignment on a topic about which you know very little. What do you do to get started? | | Total |
		0 Incorrect answer	1 Correct answer	
PRE_Q2 You have to write an assignment on a topic about which you know very little. What do you do to get started?	0 Incorrect answer	149	48	197
	1 Correct answer	75	214	289
Total		224	262	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.019[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across You have to write an assignment on a topic about which you know very little. What do you do to get started? and You have to write an assignment on a topic about which you know very little. What do you do to get started? are equally likely for the specified categories.	Related-Samples McNemar Test	.019	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q3
Crosstabs

		POST_Q3 Before searching for information on the topic of your assignment, such as "the economic impact of the 2010 World Cup", you should first:		
		0 Incorrect answer	1 Correct answer	Total
PRE_Q3 Before searching for information on a topic for your assignment, such as "violence in South African high schools", you should first	0 Incorrect answer	216	81	297
	1 Correct answer	61	128	189
Total		277	209	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.111[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Before searching for information on a topic for your assignment, such as "violence in South African high schools", you should first and Before searching for information on the topic of your assignment, such as "the economic impact of the 2010 World Cup", you should first: are equally likely for the specified categories.	Related-Samples McNemar Test	.111	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q4

Crosstabs

		POST_Q4 Which of these provide a narrower version of the following topic: "the economic impact of the 2010 World Cup"?		Total
		0 Incorrect answer	1 Correct answer	
PRE_Q4 Which of these provide a narrower version of the following topic: "violence in South African high schools"?	0 Incorrect answer	282	135	417
	1 Correct answer	17	52	69
Total		299	187	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000ᵃ
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Which of these provide a narrower version of the following topic: "violence in South African high schools"? and Which of these provide a narrower version of the following topic: "the economic impact of the 2010 World Cup"? are equally likely for the specified categories.	Related-Samples McNemar Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q5

Crosstabs

| | | POST_Q5 The best way to find information for your assignment is to start by exploring general digital information sources such as | | Total |
		0 Incorrect answer	1 Correct answer	
PRE_Q5 The best way to find information for your assignment is to start by exploring general digital information sources such as	0 Incorrect answer	192	62	254
	1 Correct answer	93	139	232
Total		285	201	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.016[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across The best way to find information for your assignment is to start by exploring general digital information sources such as and The best way to find information for your assignment is to start by exploring general digital information sources such as are equally likely for the specified categories.	Related-Samples McNemar Test	.016	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q6a

Crosstabs

		POST_Q6a For each information category on the left, circle the number of the best source to use to find the information: Current research on TB (Tuberculosis)		
		0 Incorrect answer	1 Correct answer	Total
PRE_Q6a For each information category on the left, circle the number of the best source to use to find the information: Current research on HIV/AIDS	0 Incorrect answer	118	67	185
	1 Correct answer	45	256	301
Total		163	323	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.047[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across For each information category on the left, circle the number of the best source to use to find the information: Current research on HIV/AIDS and For each information category on the left, circle the number of the best source to use to find the information: Current research on TB (Tuberculosis) are equally likely for the specified categories.	Related-Samples McNemar Test	.047	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q6b

Crosstabs

		POST_Q6b For each information category on the left, circle the number of the best source to use to find the information: Exercise and lifestyle tips as well as TV programs		Total
		0 Incorrect answer	1 Correct answer	
PRE_Q6b For each information category on the left, circle the number of the best source to use to find the information: Fashion, diet tips and celebrity information	0 Incorrect answer	59	30	89
	1 Correct answer	53	344	397
Total		112	374	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.015[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across For each information category on the left, circle the number of the best source to use to find the information: Fashion, diet tips and celebrity information and For each information category on the left, circle the number of the best source to use to find the information: Exercise and lifestyle tips as well as TV programs are equally likely for the specified categories.	Related-Samples McNemar Test	.016	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q6c

Crosstabs

		POST_Q6c For each information category on the left, circle the number of the best source to use to find the information: Description of the Tswana culture		
		0 Incorrect answer	1 Correct answer	Total
PRE_Q6c For each information category on the left, circle the number of the best source to use to find the information: Description of the Ndebele culture	0 Incorrect answer	180	64	244
	1 Correct answer	39	203	242
Total		219	267	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.018^a
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across For each information category on the left, circle the number of the best source to use to find the information: Description of the Ndebele culture and For each information category on the left, circle the number of the best source to use to find the information: Description of the Tswana culture are equally likely for the specified categories.	Related-Samples McNemar Test	.018	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q6d
Crosstabs

		POST_Q6d For each information category on the left, circle the number of the best source to use to find the information: Detailed information about the femur (thigh bone)		Total
		0 Incorrect answer	1 Correct answer	
PRE_Q6d For each information category on the left, circle the number of the best source to use to find the information: Detailed information about the humerus (arm bone)	0 Incorrect answer	96	33	129
	1 Correct answer	50	307	357
Total		146	340	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.078[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across For each information category on the left, circle the number of the best source to use to find the information: Detailed information about the humerus (arm bone) and For each information category on the left, circle the number of the best source to use to find the information: Detailed information about the femur (thigh bone) are equally likely for the specified categories.	Related-Samples McNemar Test	.079	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q7
Crosstabs

		POST_Q7 The World Wide Web (WWW) offers us various tools to access digital information sources. Which tool would be best suited to find articles about "Generic drugs for treatment of brain cancer"?		
		0 Incorrect answer	1 Correct answer	Total
PRE_Q7 The World Wide Web (WWW) offers us various tools to access digital information. Which one would be best suited to find the Web address for an institution?	0 Incorrect answer	216	124	340
	1 Correct answer	107	39	146
Total		323	163	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.292[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across The World Wide Web (WWW) offers us various tools to access digital information. Which one would be best suited to find the Web address for an institution? and The World Wide Web (WWW) offers us various tools to access digital information sources. Which tool would be best suited to find articles about "Generic drugs for treatment of brain cancer"? are equally likely for the specified categories.	Related-Samples McNemar Test	.292	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q8

Crosstabs

| | | POST_Q8 Which search engine is the most appropriate to use when you are searching for "Research methods"? | | |
		0 Incorrect answer	1 Correct answer	Total
PRE_Q8 Which search engine is the most appropriate to use when you are searching for universities in South Africa?	0 Incorrect answer	151	289	440
	1 Correct answer	19	27	46
Total		170	316	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000ᵃ
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Which search engine is the most appropriate to use when you are searching for universities in South Africa? and Which search engine is the most appropriate to use when you are searching for "Research methods"? are equally likely for the specified categories.	Related-Samples McNemar Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q9
Crosstabs

		POST_Q9 To search for information on "ANCYL (African National Congress Youth League) called for the nationalisation of mines in South Africa", which digital information access tool would be the most appropriate choice?		Total
		0 Incorrect answer	1 Correct answer	
PRE_Q9 To search for information on "Xenophobic attacks affecting refugees and asylum-seekers in South Africa", which digital information access tool would be the most appropriate choice?	0 Incorrect answer	252	104	356
	1 Correct answer	68	62	130
Total		320	166	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.007[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across To search for information on "Xenophobic attacks affecting refugees and asylum-seekers in South Africa", which digital information access tool would be the most appropriate choice? and To search for information on "ANCYL (African National Congress Youth League) called for the nationalisation of mines in South Africa", which digital information access tool would be the most appropriate choice? are equally likely for the specified categories.	Related-Samples McNemar Test	.008	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q10

Crosstabs

		POST_Q10 Digital information such as journal articles can be retrieved from databases. Which statement about databases is true?		
		0 Incorrect answer	1 Correct answer	Total
PRE_Q10 Digital information such as journal articles can be retrieved from databases. Which statement about databases is true?	0 Incorrect answer	111	68	179
	1 Correct answer	89	218	307
Total		200	286	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.110[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Digital information such as journal articles can be retrieved from databases. Which statement about databases is true? and Digital information such as journal articles can be retrieved from databases. Which statement about databases is true? are equally likely for the specified categories.	Related-Samples McNemar Test	.110	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q11

Crosstabs

		POST_Q11 Which of the following search strategies will get the best information when searching a database on the following topic: "Describe the characteristics of an asthma or hay fever attack"		
		0 Incorrect answer	1 Correct answer	Total
PRE_Q11 Which of the following search strategies will get the best information when searching a database on the following topic: "Discuss capital punishment as a deterrent to crime"	0 Incorrect answer	261	74	335
	1 Correct answer	85	66	151
Total		346	140	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.428[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Which of the following search strategies will get the best information when searching a database on the following topic: "Discuss capital punishment as a deterrent to crime" and Which of the following search strategies will get the best information when searching a database on the following topic: "Describe the characteristics of an asthma or hay fever attack" are equally likely for the specified categories.	Related-Samples McNemar Test	.428	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q12
Crosstabs

| | | POST_Q12 Give an example of a phrase search that you might use in searching for information on the following topic: Adolescent drug use in high schools | | Total |
		.00 Incorrect answer	1.00 Correct answer	
nnPRE_Q12 Give an example of a phrase search that you might use in searching for information on the following topic: Tourism management in South Africa	.00 Incorrect answer	345	51	396
	1.00 Correct answer	29	61	90
Total		374	112	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.018[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Give an example of a phrase search that you might use in searching for information on the following topic: Tourism management in South Africa and Give an example of a phrase search that you might use in searching for information on the following topic: Adolescent drug use in high schools are equally likely for the specified categories.	Related-Samples McNemar Test	.019	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

436

Q13

Crosstabs

		POST_Q13 Which criteria should you use to evaluate whether or not a particular source is valuable for using in your assignment?		Total
		0 Incorrect answer	1 Correct answer	
PRE_Q13 Which criteria should you use to evaluate whether or not a particular source is valuable for using in your assignment?	0 Incorrect answer	213	81	294
	1 Correct answer	75	117	192
Total		288	198	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.689[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Which criteria should you use to evaluate whether or not a particular source is valuable for using in your assignment? and Which criteria should you use to evaluate whether or not a particular source is valuable for using in your assignment? are equally likely for the specified categories.	Related-Samples McNemar Test	.689	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q14

Crosstabs

		POST_Q14 When would you use an article located on the Internet for writing your assignment?		
		0 Incorrect answer	1 Correct answer	Total
PRE_Q14 When would you use an article located on the Internet for writing your assignment?	0 Incorrect answer	188	65	253
	1 Correct answer	88	145	233
Total		276	210	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.075[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across When would you use an article located on the Internet for writing your assignment? and When would you use an article located on the Internet for writing your assignment? are equally likely for the specified categories.	Related-Samples McNemar Test	.075	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q15

Crosstabs

		POST_Q15 When evaluating sources of digital information, the date of the source is important depending on the topic		Total
		0 Incorrect answer	1 Correct answer	
PRE_Q15 When evaluating sources of digital information, the date of the source is only important in dealing with medical research	0 Incorrect answer	36	190	226
	1 Correct answer	44	216	260
Total		80	406	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across When evaluating sources of digital information, the date of the source is only important in dealing with medical research and When evaluating sources of digital information, the date of the source is important depending on the topic are equally likely for the specified categories.	Related-Samples McNemar Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q16

Crosstabs

		POST_Q16 If you find a web page, what would be your best clue as to whether the page is a reliable source to use in writing your assignment?		Total
		0 Incorrect answer	1 Correct answer	
PRE_Q16 If you find a web page, what would be your best clue as to whether the page is a reliable source to use in writing your assignment?	0 Incorrect answer	238	64	302
	1 Correct answer	112	72	184
Total		350	136	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000ᵃ
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across If you find a web page, what would be your best clue as to whether the page is a reliable source to use in writing your assignment? and If you find a web page, what would be your best clue as to whether the page is a reliable source to use in writing your assignment? are equally likely for the specified categories.	Related-Samples McNemar Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q17

Crosstabs

| | | POST_Q17 Which of the following is the best way to determine if the content of a Web page is accurate? | | |
		0 Incorrect answer	1 Correct answer	Total
PRE_Q17 Which of the following is the best way to determine if the content of a Web page is accurate?	0 Incorrect answer	48	27	75
	1 Correct answer	251	160	411
Total		299	187	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Which of the following is the best way to determine if the content of a Web page is accurate? and Which of the following is the best way to determine if the content of a Web page is accurate? are equally likely for the specified categories.	Related-Samples McNemar Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q18a
Crosstabs

| | | POST_Q18a For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension ___.gif | | Total |
		0 Incorrect answer	1 Correct answer	
PRE_Q18a For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension___.jpg	0 Incorrect answer	96	85	181
	1 Correct answer	96	209	305
Total		192	294	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.457[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension___.jpg and For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension ___.gif are equally likely for the specified categories.	Related-Samples McNemar Test	.457	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

442

Q18b
Crosstabs

| | | POST_Q18b For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension ___.MP3 | | Total |
		0 Incorrect answer	1 Correct answer	
PRE_Q18b For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension___.wav	0 Incorrect answer	70	181	251
	1 Correct answer	19	216	235
Total		89	397	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension___.wav and For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension ___.MP3 are equally likely for the specified categories.	Related-Samples McNemar Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q18c
Crosstabs

| | | POST_Q18c For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension ___.MPEG | | Total |
		0 Incorrect answer	1 Correct answer	
PRE_Q18c For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension___.avi	0 Incorrect answer	115	143	258
	1 Correct answer	62	166	228
Total		177	309	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension___.avi and For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension ___.MPEG are equally likely for the specified categories.	Related-Samples McNemar Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q18d

Crosstabs

		POST_Q18d For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension ___.jpg		Total
		0 Incorrect answer	1 Correct answer	
PRE_Q18d For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension___.gif	0 Incorrect answer	119	135	254
	1 Correct answer	61	171	232
Total		180	306	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension___.gif and For each file extension on the left, match the file extension to the type of document it represents on the right hand side. Write the number next to the file extension ___.jpg are equally likely for the specified categories.	Related-Samples McNemar Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q19

Crosstabs

		POST_Q19 How do you create a system to store your images, sounds, videos and text?		
		0 Incorrect answer	1 Correct answer	Total
PRE_Q19 How do you create a folder to store your images, sounds, videos and text?	0 Incorrect answer	48	13	61
	1 Correct answer	369	56	425
Total		417	69	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across How do you create a folder to store your images, sounds, videos and text? and How do you create a system to store your images, sounds, videos and text? are equally likely for the specified categories.	Related-Samples McNemar Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q20

Crosstabs

		POST_Q20 Once you've found the digital information on the Web, you can capture (store) the information. Which of the following would work to capture the information?		Total
		0 Incorrect answer	1 Correct answer	
PRE_Q20 Once you've found the digital information on the Web, you can capture (store) the information. Which of the following would work to capture the information?	0 Incorrect answer	290	73	363
	1 Correct answer	55	68	123
Total		345	141	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.133[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Once you've found the digital information on the Web, you can capture (store) the information. Which of the following would work to capture the information? and Once you've found the digital information on the Web, you can capture (store) the information. Which of the following would work to capture the information? are equally likely for the specified categories.	Related-Samples McNemar Test	.133	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q21

Crosstabs

| | | POST_Q21 "A computer virus is a term used to describe malicious programs that install themselves onto a computer. Viruses will cause a range of damage, from the very mild to the entire loss of computer data." | | Total |
		0 Incorrect answer	1 Correct answer	Total
PRE_Q21 Computer viruses can be stopped from spreading on your computer by downloading anti-virus software.	0 Incorrect answer	21	39	60
	1 Correct answer	51	375	426
Total		72	414	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.246[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Computer viruses can be stopped from spreading on your computer by downloading anti-virus software. and "A computer virus is a term used to describe malicious programs that install themselves onto a computer. Viruses will cause a range of damage, from the very mild to the entire loss of computer data." are equally likely for the specified categories.	Related-Samples McNemar Test	.246	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q22

Crosstabs

		POST_Q22 Digital storytelling is the practice of using computer-based tools to tell stories. Digital stories contain a mixture of only computer-based text and video clips.		
		0 Incorrect answer	1 Correct answer	Total
PRE_Q22 Digital storytelling is the practice of using computer-based tools to tell stories. Digital stories contain a mixture of only computer-based images and text.	0 Incorrect answer	316	50	366
	1 Correct answer	84	36	120
Total		400	86	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.004[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Digital storytelling is the practice of using computer-based tools to tell stories. Digital stories contain a mixture of only computer-based images and text. and Digital storytelling is the practice of using computer-based tools to tell stories. Digital stories contain a mixture of only computer-based text and video clips. are equally likely for the specified categories.	Related-Samples McNemar Test	.004	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q23

Crosstabs

		POST_Q23 Databases containing journal articles usually require a login code and password because it does not allow free access to all Web users.		Total
		0 Incorrect answer	1 Correct answer	
PRE_Q23 Companies prevent people from using fee-based information by providing login codes and passwords; users pay ''per-use'' of the digital information or users pay a subscription fee.	0 Incorrect answer	64	87	151
	1 Correct answer	69	266	335
Total		133	353	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.173[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Companies prevent people from using fee-based information by providing login codes and passwords; users pay ''per-use'' of the digital information or users pay a subscription fee. and Databases containing journal articles usually require a login code and password because it does not allow free access to all Web users. are equally likely for the specified categories.	Related-Samples McNemar Test	.173	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q24

Crosstabs

		POST_Q24 Copyright protects original works of authorship in any format (text, music, pictures and video). What can you print or copy to use in your assignments?		Total
		0 Incorrect answer	1 Correct answer	
PRE_Q24 Copyright protects original works of authorship in any format (text, music, pictures and video). What can you print or copy to use in your assignments?	0 Incorrect answer	202	78	280
	1 Correct answer	66	140	206
Total		268	218	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.359[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Copyright protects original works of authorship in any format (text, music, pictures and video). What can you print or copy to use in your assignments? and Copyright protects original works of authorship in any format (text, music, pictures and video). What can you print or copy to use in your assignments? are equally likely for the specified categories.	Related-Samples McNemar Test	.359	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q25

Crosstabs

		POST_Q25 You want to use some of the information found in an online journal article for your assignment. Which situation requires that you cite the source of your information to prevent plagiarism?		Total
		0 Incorrect answer	1 Correct answer	Total
PRE_Q25 You want to use some of the information found in an online journal article for your assignment. Which situation requires that you cite the source of your information to prevent plagiarism?	0 Incorrect answer	257	63	320
	1 Correct answer	86	80	166
Total		343	143	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.071ᵃ
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across You want to use some of the information found in an online journal article for your assignment. Which situation requires that you cite the source of your information to prevent plagiarism? and You want to use some of the information found in an online journal article for your assignment. Which situation requires that you cite the source of your information to prevent plagiarism? are equally likely for the specified categories.	Related-Samples McNemar Test	.071	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q26

Crosstabs

		POST_Q26 Assuming that you need to add some of this information into the assignment you are writing, please select from the citations (a-d) the correct way to cite the source (using the Harvard Referencing style)		Total
		0 Incorrect answer	1 Correct answer	Total
PRE_Q26 Assuming that you need to add some of this information into the assignment you are writing, please select from the citations (a-d) the correct way to cite the source (using the Harvard Referencing style)	0 Incorrect answer	158	160	318
	1 Correct answer	97	71	168
Total		255	231	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Assuming that you need to add some of this information into the assignment you are writing, please select from the citations (a-d) the correct way to cite the source (using the Harvard Referencing style) and Assuming that you need to add some of this information into the assignment you are writing, please select from the citations (a-d) the correct way to cite the source (using the Harvard Referencing style) are equally likely for the specified categories.	Related-Samples McNemar Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q27a

Crosstabs

| | | POST_Q27a References for different types of digital information sources. Match the items in the gray box area to each reference: a. ___ South African Revenue Service. | | Total |
		0 Incorrect answer	1 Correct answer	
PRE_Q27a References for different types of digital information sources. Match the items in the gray box area to each reference: a.___ South African Revenue Service	0 Incorrect answer	151	47	198
	1 Correct answer	66	222	288
Total		217	269	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.090[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across References for different types of digital information sources. Match the items in the gray box area to each reference: a.___ South African Revenue Service and References for different types of digital information sources. Match the items in the gray box area to each reference: a. ___ South African Revenue Service. are equally likely for the specified categories.	Related-Samples McNemar Test	.090	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q27b

Crosstabs

		POST_Q27b References for different types of digital information sources. Match the items in the gray box area to each reference: b. ___ African National Congress.		
		0 Incorrect answer	1 Correct answer	Total
PRE_Q27b References for different types of digital information sources. Match the items in the gray box area to each reference: b. ___ African National Congress	0 Incorrect answer	247	65	312
	1 Correct answer	72	102	174
Total		319	167	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.608ᵃ
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across References for different types of digital information sources. Match the items in the gray box area to each reference: b. ___ African National Congress and References for different types of digital information sources. Match the items in the gray box area to each reference: b. ___ African National Congress. are equally likely for the specified categories.	Related-Samples McNemar Test	.608	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q27c

Crosstabs

| | | POST_Q27c References for different types of digital information sources. Match the items in the gray box area to each reference: c. ___ Baleta, A. | | Total |
		0 Incorrect answer	1 Correct answer	
PRE_Q27c References for different types of digital information sources. Match the items in the gray box area to each reference: c. ___ Mandela, M	0 Incorrect answer	191	69	260
	1 Correct answer	108	118	226
Total		299	187	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.004[a]
N of Valid Cases	486	

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across References for different types of digital information sources. Match the items in the gray box area to each reference: c. ___ Mandela, M and References for different types of digital information sources. Match the items in the gray box area to each reference: c. ___ Baleta, A. are equally likely for the specified categories.	Related-Samples McNemar Test	.004	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q27d

Crosstabs

| | | POST_Q27d References for different types of digital information sources. Match the items in the gray box area to each reference: d. ___ Gray, H. | | |
		0 Incorrect answer	1 Correct answer	Total
PRE_Q27d References for different types of digital information sources. Match the items in the gray box area to each reference: d. ___ Graig, W.J. (ed.)	0 Incorrect answer	169	52	221
	1 Correct answer	107	158	265
Total		276	210	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across References for different types of digital information sources. Match the items in the gray box area to each reference: d. ___ Graig, W.J. (ed.) and References for different types of digital information sources. Match the items in the gray box area to each reference: d. ___ Gray, H. are equally likely for the specified categories.	Related-Samples McNemar Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q28

Crosstabs

		POST_Q28 Organise your digital information by creating an outline. Which one of the following figures do you think represents the best way of organising information on general health?		Total
		0 Incorrect answer	1 Correct answer	
PRE_Q28 Organise your digital information by creating an outline. Which one of the following figures do you think represents the best way of organising vegetarianism?	0 Incorrect answer	273	136	409
	1 Correct answer	52	25	77
Total		325	161	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Organise your digital information by creating an outline. Which one of the following figures do you think represents the best way of organising vegetarianism? and Organise your digital information by creating an outline. Which one of the following figures do you think represents the best way of organising information on general health? are equally likely for the specified categories.	Related-Samples McNemar Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q29

Crosstabs

		POST_Q29 Integrating your information and then creating your own information product, is called synthesising. Do you think the following is a good example of what an assignment should look like?		Total
		0 Incorrect answer	1 Correct answer	Total
PRE_Q29 Integrating your information and then creating your own information product, is called synthesising. Do you think the following is a good example of what an assignment should look like?	0 Incorrect answer	51	50	101
	1 Correct answer	57	328	385
Total		108	378	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.562[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric Tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Integrating your information and then creating your own information product, is called synthesising. Do you think the following is a good example of what an assignment should look like? and Integrating your information and then creating your own information product, is called synthesising. Do you think the following is a good example of what an assignment should look like? are equally likely for the specified categories.	Related-Samples McNemar Test	.562	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Q30

Crosstabs

		POST_Q30 Which one of the following is not a current awareness service?		
		0 Incorrect answer	1 Correct answer	Total
PRE_Q30 Which one of the following is not a current awareness service?	0 Incorrect answer	239	150	389
	1 Correct answer	67	30	97
Total		306	180	486

Chi-Square Tests

	Value	Exact Sig. (2-sided)
McNemar Test		.000[a]
N of Valid Cases	486	

a. Binomial distribution used.

Nonparametric tests

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distributions of different values across Which one of the following is not a current awareness service? and Which one of the following is not a current awareness service? are equally likely for the specified categories.	Related-Samples McNemar Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.