Using HCI principles to design an interactive guide for a university orientation program

Mampho Ledimo

STUDENT NUMBER: 23600942

Honours IT Research Project

in the

SCHOOL OF INFORMATION TECHNOLOGY

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FACULTY OF ECONOMIC SCIENCES AND INFORMATION TECHNOLOGY

at the

NORTH-WEST UNIVERSITY (VAAL TRIANGLE CAMPUS)

Supervisor: Ms. JT Terblanche

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Chapter 1: Introduction

1.1 Introduction and background

The goal of this study is to identify which HCI principles to apply in the design of an interactive guide for a university orientation program. The interactive guide will be proposed to be used during orientation week at the North-West University at the Vaal Triangle Campus in the future. According to Coughlan (2013) studies suggest that reading is an activity that occurs more frequently on screens rather than on printed page due to high level usage of technological devices. Coughlan (2013) further supports his statement by also stating that technology has become central to the lives of the youth.

Today's youth are growing up with the mentality that communication is facilitated through the use of technology (Batat, 2009:153). Youth are utilising socially interactive technologies to enrich communication between themselves and others (Bryant *et al.* 2006:577). According to Ito *et al.* (2008:1) communication through digital technology has become inescapable in the lives of the youth.

Khan (2010) states that about 10 hours is spent on electronic content daily by the youth which dramatically increased the time spent on digital technology by the youth in the past years. Herrick et al. (2014) reports that about nine in ten of the youth spend time utilising a computer on a daily basis.

With the above mentioned, it can be concluded that the youth of today are technology centric. Considering the issue that printed paper is being rapidly dominated by the use of computers or digital gadgets, there is an ideal necessity to convert paper based information or communication to electronic content. Therefore this puts emphasis on the concept of this research which substitutes paper based programmes for orientation week by designing an interactive orientation guide using HCI principles.

The objective of this chapter is to familiarise the study by explaining the theoretical concepts of the study in Section 1. 2 followed by an introduction of the research problem and objectives in Section 1.3. The research methodology employed in the study is defined in Section 1.4. The participants are discussed in Section 1.5 followed by the ethical considerations in in Section 1.6. A layout of the study is provided in Section 1.7 followed by the chapter conclusion in Section 1.8.

1.2 Theoretical concepts

The following key concepts are explained for user understanding.

1.2.1 HCI and HCI principles

Interaction is a manner of transferring information (Dix *et al.*, 2004:124). According to Rouse (2005) human-computer interaction (HCI) is the study of the way in which people interact with computers. HCI can be referred to as the mediator of communication between the computer and the human (Tripathi, 2011:1). HCI is the study concerned with how to design, evaluate and implement the interaction between humans and computers (Hewett *et al.*, 2009). Tripathi (2011:1) further states that the basic objective of HCI is to make computers more user-friendly in order to improve the interaction between user and computer. HCI principles therefore ensure a certain standard on the usability and communication between the computer and the human.

1.2.2 Interactive guides

Interaction is a way of communication between two different processes. Guides are essential for providing information, instructions and advice. An interactive guides is a type of guiding tool that involves interaction between user and computer for effective information exchange.

1.2.3 Design science research

Design science research is based on the development of new knowledge through the creation of new and innovative artefacts and the evaluation of the artefacts centred on the usage and performance (Vaishnavi & Kuechler, 2004). According to Hevner *et al.* (2004:76) design science develops and analyses the artefacts that are intended to solve specific organisational problems.

Now that there is a common understanding of the research theoretical concepts, the research problem and objectives will be discussed.

1.3 Research Problem and Objectives

The purpose of defining a research problem and objectives is to aid the direction the research process in order to successfully achieve the objective of the study.

1.3.1 Research Problem

According to Shupp (2014) first year orientation programmes are significant in the assistance of successful transition for students. Unfortunately, most students find it difficult to follow all the activities involved in the orientation programme. Some students either misplace the programme or do not understand the programme or in most cases find the programme uninteresting to go through.

Taking into account that the youth of today are technology centric, providing the orientation programme as an electronic application can help improve the availability, usability and even the appearance of the orientation guide. This therefore highlighted the necessity for this

research which is to determine which HCI principles can be applied in the design of an interactive guide for orientation week. Utilising HCI principles will enhance the experience of the interaction between the student and the computer which will result in a better response to the orientation guide.

1.3.2 Research Objectives

The following research objectives are clear and declarative statements that will help provide direction for the research.

1.3.2.1 Primary Objective

- To identify which HCI principles to apply in the design of an interactive guide for a university orientation program.

To be able to meet the above mentioned primary objective, it is important to understand and complete the following secondary objectives.

1.3.2.2 Secondary Objectives

The secondary objectives are divided into theoretical objectives and empirical objectives as described in the following.

1.3.2.2.1 Theoretical objectives

In order to successfully achieve the primary objective, the following theoretical objectives were established for this study:

- Develop an understanding of design science research.
- Understand HCI concepts.
- Learn how to implement HCI principles.
- Find HCI principles that are relevant for interactive applications.
- Research on programming languages that help with applications of HCI principles.
- Gain knowledge of the typical features of an interactive interface for interactive guides.

1.3.2.2.2 Empirical Objectives

In accordance with the primary objective of this study, the following empirical objectives were established:

- Learn how to use Articulate Storyline.
- Conduct interviews to gather user requirements.
- Conduct data analysis of the gathered requirements.
- Develop an interactive guide artefact that illustrates the use of HCI principles.

1.4 Research Methodology

A methodology is a set of principles, practices and procedures used to a specific field of knowledge (Peffers *et al.*, 2007: 49). Leedy and Ormrod (2001) define research methodology as the common approach in executing a research project. For the purpose of this research, the methodology that will be applied is the design science research methodology.

According to Hevner *et al.* (2004:77) design science research develops and evaluates IT artefacts that are aimed at solving acknowledged organizational problems. Design science research is centred on innovation through design (Baskerville, 2008:441).Design science research focuses on creating a new and innovative artefact to solve a specific problem, which makes it appropriate to apply to this research study as the objective is to design an interactive guide. Design science research will be applied in order to effectively design and complete artefact.

According to Lazar (2010:177) HCI researchers use interviews and focus group sessions to assist with the understanding of core concepts of the people that might utilise and interact with the current or the future computer system. Lazar (2010:177) further states that interviews can be useful to gather information during development phases as early feedback can help in validating and clarifying the design approach of designer. For this research study, the conducting of interviews will be used to gather insight and requirements prior to the development phase. The participant interviews will be utilised to gather requirements for the artefact.

1.5 Participants

Participants of the interviews will comprise of the employees of the university's student affairs office. It will be beneficial to interview officials that work and compile the traditionally used orientation table in order to gain insight and gather specific design requirements for the interactive guide. Interviews will be repeated until saturation of information is achieved. Ethical considerations should always be identified when conducting interviews for research purposes.

1.6 Ethical Considerations

According to Resnik (2011) ethics are the norms for conduct that differentiate between rightful and wrongful behaviour. Resnik (2011) further states that ethics highlight essential values such as mutual respect, trust and accountability when conducting research. Ethical considerations are therefore important when conducting interviews with participants.

Ethical considerations include:

- Making it clear that partaking in the interview is voluntary.
- Informing participants that they can withdraw at own choice.
- Asking permission from participant to use confidential information and input that they might provide.

1.7 Layout of study

This study comprises of the following chapters:

Chapter 1: Introduction and motivation for the study- This chapter will serve as an overview of the study which also outlines the necessity of the research of HCI principles applied in interactive guides.

Chapter 2: Research methodology-This chapter will explain in detail how the DSR methodology will be applied and incorporated with HCI principles.

Chapter 3: Literature review - This chapter will discuss existing literature on the key concepts of the study.

Chapter 4: Data analysis- This chapter addresses the suggestion phase of this study's methodology which includes the data gathering technique used as well analysis of the obtained data.

Chapter 5: The artefact design- This chapter will showcase the interactive guide artefact that uses design science research methodology integrated with HCI principles.

Chapter 6: Conclusion: This chapter will provide the overview of the study by summarising the events of the research study, elaborating on the limitations of the study and stating insight for future research.

1.8 Conclusion

Since it has been established that orientation week is important for first year students, the intent of this research is to design the orientation week guide that will be accessible and more capturing for first year students. Eliminating the paper-based orientation programmes, design science research will be used in the design of the interactive guide artefact for orientation week. Through the effective use of HCI principles applied to the design of the interactive guide, the user experience could be capturing and satisfying.

The next chapter discusses the existing literature based on research methodology, with the detailed emphasis on design science research as well as the research process and approach.

Chapter 2: Research Methodology

2.1   Introduction

The goal of this study is to identify which HCI principles to apply in the design of an interactive guide for a university orientation program. In order to effectively achieve this, a discussion of the literature established on research methodology and design science research is significant.

Research is developing new knowledge (Oates, 2006). According to Vaishnavi and Kuechler (2004) research can be described as a pursuit that contributes to the knowledge of a topic. Research methodology is an approach of discovering the results and outcomes of a specific research problem (Williams, 2011). The chapter aims to elaborate on the understanding of research methodology and reasons why design science research was chosen to conduct the research.

The research methodology on which this chapter is discussed begins by focusing on the research process and elaborating on the DSR study publication schema (Section 2.2), followed by the research problem and objectives (Section 2.3).Research paradigms are the focus in Section 2.4. Design science research is clearly defined as well as the DSR framework (Section 2.5). A discussion on the data gathering techniques and participants is provided in Section 2.6, which precedes the explanation of the intentions of the gathered data (Section 2.7). Description of the ethics to be considered when conducting the research study provided in Section 2.8 followed by the overall summary of the chapter (Section 2.9).

2.2   The research process

A research process is a series of steps required in the development of specific research (Williams, 2013). In general terms, a research process outlines certain activities to execute in the development of a research study. A research study therefore involves step-by-step processes in order to effectively met research objectives.

The publication schema for a design science research study as depicted in Table 2.1 below will be applied in order to successfully achieve the primary objective of this study. For this study the introduction will introduce the research topic which is using HCI principles to design an interactive guide as well as elaborate on the research problem and objectives. The literature review will comprise of an analysis of the existing literature on human computer-interaction, HCI principles and interactive applications. The method that will be used is design science research because the objective is to design an innovative interactive guide artefact. The artefact description is an innovative guide that is interactive, captivating and is user friendly. The guide will be used by first year students during orientation. The evaluation,

discussion and conclusion for this study will be dependent on the level of satisfaction meet according to data requirements that will be gathered.

Table 2.1: Publication Schema for a Design Science Research Study (Gregor & Hevner, 2013)

	Section	Contents
1.	Introduction	*Problem definition, problem significance/motivation, introduction to key concepts, research questions/objectives, scope of study, overview of methods and findings, theoretical and practical significance, structure of remainder of paper.* For DSR, the contents are similar, but the problem definition and research objectives should specify the **goals** that are required of the artifact to be developed.
2.	Literature Review	*Prior work that is relevant to the study, including theories, empirical research studies and findings/reports from practice.* For DSR work, the prior literature surveyed should include any prior design theory/knowledge relating to the class of problems to be addressed, including artifacts that have already been developed to solve similar problems.
3.	Method	*The research approach that was employed.* For DSR work, the specific DSR approach adopted should be explained with reference to existing authorities.
4.	Artifact Description	A concise description of the artifact at the appropriate level of abstraction to make a new contribution to the knowledge base. This section (or sections) should occupy the major part of the paper. The format is likely to be variable but should include at least the description of the designed artifact and, perhaps, the design search process.
5.	Evaluation	Evidence that the artifact is useful. The artifact is evaluated to demonstrate its worth with evidence addressing criteria such as validity, utility, quality, and efficacy.
6.	Discussion	*Interpretation of the results: what the results mean and how they relate back to the objectives stated in the Introduction section. Can include: summary of what was learned, comparison with prior work, limitations, theoretical significance, practical significance, and areas requiring further work.* Research contributions are highlighted and the broad implications of the paper's results to research and practice are discussed.
7.	Conclusions	*Concluding paragraphs that restate the important findings of the work.* Restates the main ideas in the contribution and why they are important.

2.2   Research problem and objectives

2.2.1   Research problem

According to Shupp (2014) first year orientation programmes are significant in the assistance of successful transition for students. Unfortunately, most students find it difficult to follow all the activities involved in the orientation programme. Some students either misplace the programme or do not understand the programme or in most cases find the programme uninteresting to go through.

Taking into account that the youth of today are technology centric, providing the orientation programme as an electronic application can help improve the availability, usability and even the appearance of the orientation guide. This therefore highlighted the necessity for this research which is to determine which HCI principles can be applied in the design of an interactive guide for orientation week. Utilising HCI principles will enhance the experience of the interaction between the student and the computer which will result in a better response to the orientation guide.

2.2.2 Research objectives

The following research objectives are clear and declarative statements formulated to help provide direction for the research.

2.3.2.1 Primary Objective

- To identify which HCI principles to apply in the design of an interactive guide for a university orientation program.

To be able to meet the above mentioned primary objective, it is important to understand and complete secondary objectives that support the primary objective.

2.3.2.2 Secondary Objectives

In order to achieve the primary objective, the secondary objectives are divided into theoretical objectives and empirical objectives

2.3.2.2.1 Theoretical objectives:

- Develop an understanding of design science research.
- Understand HCI concepts.
- Learn how to implement HCI principles.
- Find HCI principles that are relevant for interactive applications.
- Research on programming languages that help with applications of HCI principles.
- Gain knowledge of the typical features of an interactive interface for interactive guides.

2.3.2.2.2 Empirical Objectives:

- Learn how to use Articulate Storyline.
- Conduct interviews to gather user requirements.
- Conduct data analysis of the gathered requirements.
- Develop an interactive guide artefact that illustrates the use of HCI principles.

2.3   Research paradigms

A paradigm is a set of assumptions about how things work, therefore it is a certain way of viewing something.

There are four philosophical assumptions namely; ontological, epistemological, methodology and axiology. Ontological assumptions are related to the nature of reality (Blanche *et al.* 2006:6). Epistemological assumptions comprises of the knowledge acquired in field of study (Blanche *et al.* 2006:6). Methodological assumptions concerned with the ways the research will utilize the knowledge that exist in research study (Blanche *et al.* 2006:6). Axiology

assumptions refers to the things the researcher believes are of value to the research study (Vaishnavi & Kuechler, 2004).

There are four research paradigms types namely: positivist, interpretivist, constructionist and design science. Table 2.2 represents the research paradigms and their philosophical assumptions.

The *positivistic* research paradigm is a paradigm that states that knowledge is gained through experience of reality (Noor, 2008:1602). According to Adebsin *et al.* (2011:310) positivistic research paradigm is based on the assumption that the world we live in is orderly arranged.

The *interpretivist* research paradigm is a paradigm with a purpose to gain in-depth understanding of the content of the research study (Oates, 2006:292). Qualitative research methods are usually used in interpretative studies. The interpretive researcher goes beyond facts to gain meaning (Noor, 2008:1602).

The *constructionist* research paradigm makes the assumption that realities are socially constructed (Myers, 2009:43). Myers (2009:43) also states that constructionist research focuses on the conflicting and contradictory conditions in society and seeks to reach emancipation.

The *design science research* paradigm requires the development of an innovative and purposeful artefact (Hevner *et al.*, 2007:82). According to Hevner *et al.* (2007:82) the fundamental principle of DSR is that the knowledge and understanding of a design problem and its solution are acquired in the development and application of an artefact. Vaishnavi and Kuechler (2004) state that design science is the based on the concept of knowledge through development.

For the purpose of this study, the design science paradigm is the most relevant paradigm as the objective of this study is centred on the development of an artefact. Design science research also analyses the performance and usability of the developed artefact in order to thoroughly understand and improve the artefact (Vaishnavi & Kuechler, 2004). Therefore, this study will also incorporate aspects of the interpretive paradigm as qualitative methods for data gathering will be used for thorough understanding of the study.

Table 2.2: Research paradigms and their philosophical assumptions (Adebesin, 2011; Terre Blanche and Durrheim, 2006; Vaishnavi and Kuechler, 2004)

Research paradigms	Philosophical assumptions			
	Ontology	Epistemology	Methodology	Axiology
Positivist	- Single, stable reality - Law-like	- Objective - Detached observer	- Experimental - Quantitative - Hypothesis testing	- Truth (objective) - Prediction
Interpretive	- Multiple realities - Socially constructed	- Empathetic - Observer subjectivity	- Interactional - Interpretation - Qualitative	- Contextual understanding
Critical/ Constructionist	- Socially constructed reality - Discourse - Power	- Suspicious - Political - Observer constructing Versions	- Deconstruction - Textual analysis - Discourse analysis	- Inquiry is value-bound - Contextual understanding - Researcher's values affect the study
Design	- Multiple, contextually situated realities	- Knowing through making - Context-based construction	- Developmental - Impact analysis of artefact on composite system	- Control - Creation - Understanding

Since this study makes use of DSR, it is crucial that the paradigm is discusses extensively.

2.4   Design science research

Design science research is well-defined in information systems as the research that involves construction of a wide range of socio-technical artefacts such as modelling tools and decision support systems (Gregor & Hevner, 2013:337). According to Hevner *et al.* (2004:77) design science research develops and evaluates IT artefacts that are aimed at solving acknowledged organizational problems. Simon (1996:4) defines DSR as the body of knowledge about the design of artificial items that are designed to meet certain goals. Design science research is centred on innovation through design (Baskerville, 2008:441).

There are various approaches for the DSR framework however for the purpose of this research study the approach suggested by Vaishnavi & Kuechler (2004) in Figure 2.1 will be utilised.
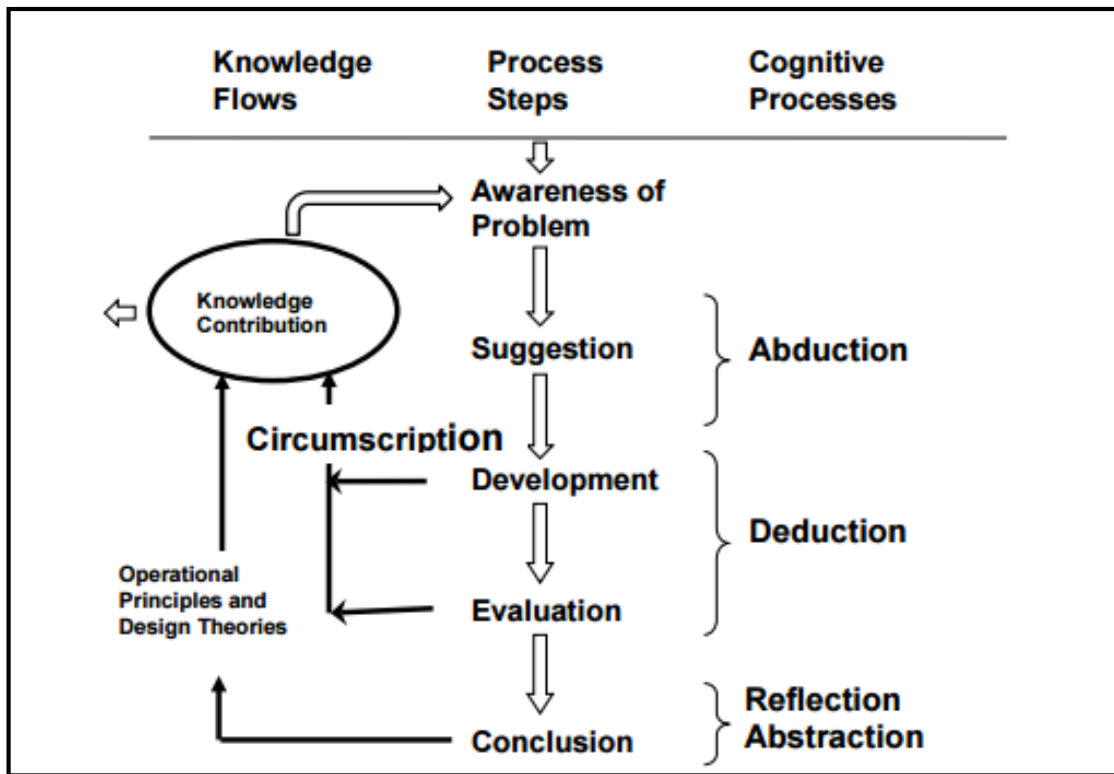

Figure 2.1: Design science research framework (Vaishnavi & Kuechler, 2004)

This approach contains five phases namely; awareness of problem, suggestion, development, evaluation and conclusion as demonstrated in Figure 2.1.

1. *Awareness of problem*-In this phase the researcher becomes aware of an interesting problem and the output is a research proposal for an innovative research effort.

   In terms of this research study, the researcher became aware of a problem which was an inefficiency of communication between officials and first year students regarding orientation week activities.

2. Suggestion-In this phase the researcher identifies an appropriate and relevant solution to the observed problem. The suggested solution can be based on existing or new solutions.

   For this research study, the suggestion is to develop an artefact which is an interactive guide for orientation week that will help eliminate the problem identified. A literature review will be conducted in order to identify the appropriate HCI principles that could

be applied in the design of the suggested artefact. Interviews will be conducted as the data gathering method to obtain insight and suggestions from officials. The researcher will then analyse the gathered data by using open coding by Strauss and Corbin in order to determine key design aspects that could assist in the design of the artefact.

3. *Development*-In this phase the suggested solution is implemented and developed by the researcher.

   During the developmental phase of this study, the researcher will incorporate and apply the HCI principles identified and the feedback obtained during the interviews in the design and development of the interactive guide.

4. *Evaluation*-In this phase, using data gathering methods the developed artefact is assessed and evaluated.

   After the artefact is created, the requirements gathered through interviews during the suggestion phase will be re-visited and will used to evaluate the efficiency and accuracy of the interactive guide.

5. Conclusion-This phase, the finale of the research is reached if the artefact is found satisfactory.

   After the evaluation phase, the artefact will be found satisfactory if it meets the requirements gathered prior the development phase.

Design science research requires the development of an innovative and purposeful artefact (Hevner *et al.*, 2007:82).Depending on the satisfactory of the end product, these five phases form an iterative approach. According to Hevner *et al.* (2007:82) the fundamental principle of DSR is that the knowledge and understanding of a design problem and its solution are acquired in the development and application of an artefact. Table 2.2 is a summary of the guidelines presented by Hevner *et al.* (2007:82).

Table 2.3: Design-Science Research Guidelines (Hevner *et al.*, 2004:84)

Guideline	Description
Guideline 1: Design as an Artifact	Design-science research must produce a viable artifact in the form of a construct, a model, a method, or an instantiation.
Guideline 2: Problem Relevance	The objective of design-science research is to develop technology-based solutions to important and relevant business problems.
Guideline 3: Design Evaluation	The utility, quality, and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation methods.
Guideline 4: Research Contributions	Effective design-science research must provide clear and verifiable contributions in the areas of the design artifact, design foundations, and/or design methodologies.
Guideline 5: Research Rigor	Design-science research relies upon the application of rigorous methods in both the construction and evaluation of the design artifact.
Guideline 6: Design as a Search Process	The search for an effective artifact requires utilizing available means to reach desired ends while satisfying laws in the problem environment.
Guideline 7: Communication of Research	Design-science research must be presented effectively both to technology-oriented as well as management-oriented audiences.

2.5   Data gathering techniques and participants

There are various data gathering techniques available for academic researchers. The most common data gathering techniques are: interviews, questionnaires, observations and documents (Oates, 2006:36). The techniques are defined as follows:

- Interviews are often face-to-face interactions where a series of questions are asked and interviews are categorized into types: structured, unstructured or semi-structured (Rogers *et al.*, 2011:211).
- Questionnaires are a set of questions aimed to extract specific information (Rogers *et al.*, 2011:211).
- Observations comprises of organised observation, recording, description analysis and interpretation of human behaviour (Sanders *et al.*, 2009:288)
- Documents are any additional documents that will help assist researcher's understanding of the research topic (Sanders *et al.*, 2009:288)

According to Kimball *et al.* (2008:66) interviews encourage a high level of participation from participants, which results in detailed data. This enables researcher to gain valid and constructive feedback from participants. For the purpose of this study interviews will be used

as the data gathering method. Interviews will be used to gather insight and requirements prior to the development phase. The participants involved in the interviews will consist of officials of the university who are involved in compiling the traditionally used orientation programme.

2.6   Results of data analysis

To analyse the data gathered from the interviews, open coding will be used. Strauss and Corbin (1990: 62) describe open coding as a procedure which entails the breaking down of the data into discrete parts, closely examining and comparing the data for similarities and difference. Open coding is therefore a process of interpretation with the purpose of discovering concepts based on the data. The results of the data analysis will be taken into consideration during the development phase.

2.7   Ethics

According to Resnik (2011) ethics are the norms for conduct that differentiate between rightful and wrongful behaviour. Resnik (2011) further states that ethics highlight essential values such as mutual respect, trust and accountability when conducting research. Ethical considerations are therefore important when conducting interviews with participants.

Ethical considerations include:

- Making it clear that partaking in the interview is voluntary.
- Informing participants that they can withdraw at own choice.
- Asking permission from each participant to use confidential information and input that they might provide.

2.8   Summary

The objective of this chapter was to gain insight and understanding of the research methodology. Research, research processes, research paradigms and research approaches for this study were discussed and specific detail was provided on how the research will be conducted. The main focus of the chapter was design science research methodology.

Since the main objective of this study is to create an artefact, design science research methodology will be used. The discussion of the research process, the DSR framework and DSR guidelines provide insight on how to execute the research study. Interpretative analysis will be used through conducting interviews aimed at gathering data requirements from participants.

The next chapter introduces a detailed literature review of HCI principles, interactive guides and the appropriate application of HCI principles.

Chapter 3: Literature review

3.1 Introduction

The goal of this study is to identify which HCI principles to apply in the design of an interactive guide for a university orientation program. In order to successfully achieve this, it is significant to discuss existing literature on the key concepts of this study.

A literature review is a critical discussion and summary of studies that are established in the literature related to a particular area (Boote, 2005). According to Cornford (2006:109) it is crucial to conduct a literature review in order to know what other people have done or said regarding the research study and it enables a researcher to utilise their insights and contributions. Brewster (2009) further elaborates this by stating that we see further when we stand on the shoulders of giants. In other words, a researcher gains further understanding and insight of a respective research study through conducting a literature review. Therefore it can be concluded that conducting a literature review is an essential part of a research study.

The literature analysis on which this chapter is based on begins by discussing the traditional tools currently used for guides in Section 3.2 followed by an exploration of interactive applications in Section 3.3. Human-Computer Interaction is explained which includes a discussion on general HCI principles in Section 3.4. An overview of the HCI principles that are relevant and appropriate to interactive timetabling is provided in Section 3.5 followed by the summary in Section 3.6.

3.2 Traditional tools for timetabling

Timetabling can be viewed as a type of scheduling where the mission is to allocate activities to available slots (Muller, 2002). Timetabling is usually solved manually because of lack of appropriate computer tools (Cambazard, 2005). Typical timetables are usually simple and created manually or in basic spreadsheet format. According to Schaerf (1999:87) the manual solution for timetabling is time consuming and sometimes may be unsatisfactory to the user. The quality of timetabling has a tremendous impact on the users of the developed timetable (Qu, 2009:56). For the purpose of the interactive guide, it is crucial to incorporate timetabling into the design of the guide. To develop a quality guide that incorporates timetabling, an appropriate tool is interactive applications and an in-depth explanation will follow in the next section.

3.3 Interactive applications

Interaction is a manner of transferring information (Dix *et al.*, 2005). Interactive applications or systems are computer-orientated, characterised by significant amounts of interaction between people and the computer (Spring, 2002). The objective of interactive applications is to aid the

interaction between the user and computer in order for tasks to be carried out effortlessly (Peintner *et al.*, 2008). In general terms interactive applications refer to computer or technological applications designed with interactive components. Peintner *et al.* (2008) further states that interactive applications can be viewed as the sort of systems that involve a high degree of interaction with users in their operations. Interactive applications are any technology integrating some form of electronic logic designed to facilitate and empower user interaction. The concept of interactive applications can be used in an innovative way to create interactive guides. The interactive guide design is aimed to be interactive and informative for the students. The interactive guide will be an electronic application where students can access it on any digital component, personal cell phone, computer etc. For an effective and successful design of an interactive guide application, human-computer interaction principles should be considered.

3.4 Human-Computer Interaction

Human-computer interaction (HCI) is the study of the way in which people interact with computers (Rouse, 2005). HCI can be referred to as the mediator of communication between the computer and the human (Tripathi, 2011:1). In general terms, HCI is the study of interaction between computers and people with the intention of understanding and refining these interactions.

HCI is the study concerned with how to design, evaluate and implement the interaction between human and computers (Hewett *et al.*, 2009). Tripathi (2011:1) further states that the basic objective of HCI is to make computers more user-friendly in order to improve the interaction between user and computer. Within the context of HCI, different HCI principles have been discovered over time. HCI therefore provides designers with principles that are essential for the design of effective interfaces that are clear and easy to use.

3.4.1 HCI principles

HCI principles have been established over the years in order to emphasise the importance of the effective design of interaction between human and computers. Dix *et al.* (2004:259) defines HCI principles as design rules that are guidelines in the design of effective interactive systems.

The following are some examples of HCI principles:

- Visibility
  The principle of visibility focuses on the aspect that the more the function is visible, the more likely that the user will know what to do next (Norman, 2002). For example, when a button that is functional is hidden on an interface, this causes confusion and user

does not know what is expected to be done next. To avoid unnecessary confusion for the user, it is essential for the functional buttons to be visible (See Figure 3.1 for an example of visibility).
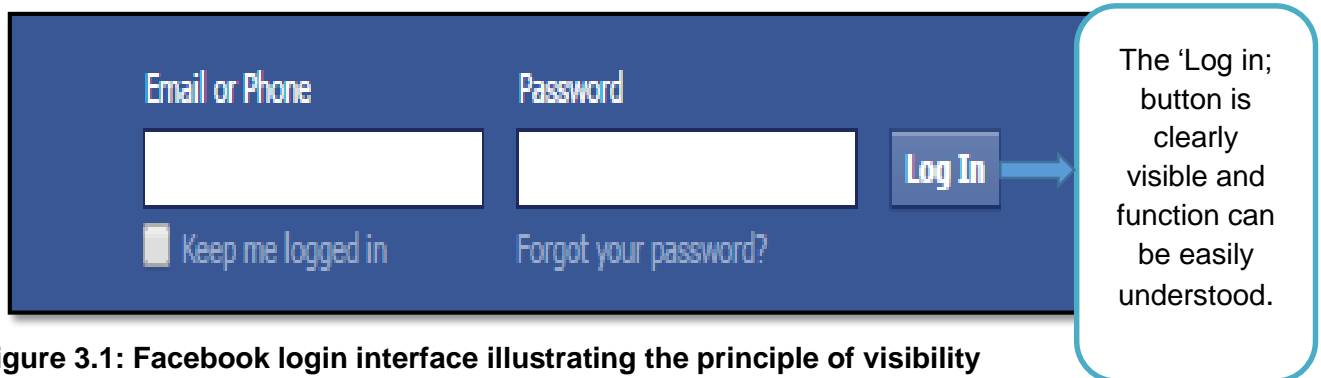

Figure 3.1: Facebook login interface illustrating the principle of visibility (https://www.facebook.com/)

- Consistency

The principle of consistency refers to the resemblance of interfaces from similar application objectives (Dix *et al.*, 2004:264). Interfaces should be consistent in a meaningful manner (Norman, 2002). Consistency creates a familiar impression throughout the application. Consistency eliminates the chances of user not knowing how to navigate through the application.

It is evident that from Figure 3.2 and Figure 3.3, the main layout design remains constant and what differentiates the selected interface is the subject and content of each. This is a good example as the user relies on consistency and it is used to navigate through the different sporting news.

Figure 3.2: Supersport website: Rugby interface illustrating the principle of consistency (http://www.supersport.com/rugby)

Figure 3.3: Supersport website: Cricket interface illustrating the principle of consistency (http://www.supersport.com/cricket)

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- Customizability

  This principle of customizability is focused on providing the user the privilege to customise the application to their own preferential choice (Dix *et al.*, 2004:269). For example, allowing the user to customize a laptop desktop in order to create the impression of familiarity and ownership. Customizability usually includes, moving of icons, changing the background and adding specific shortcuts. (See Figure 3.4 for an example of customizability).
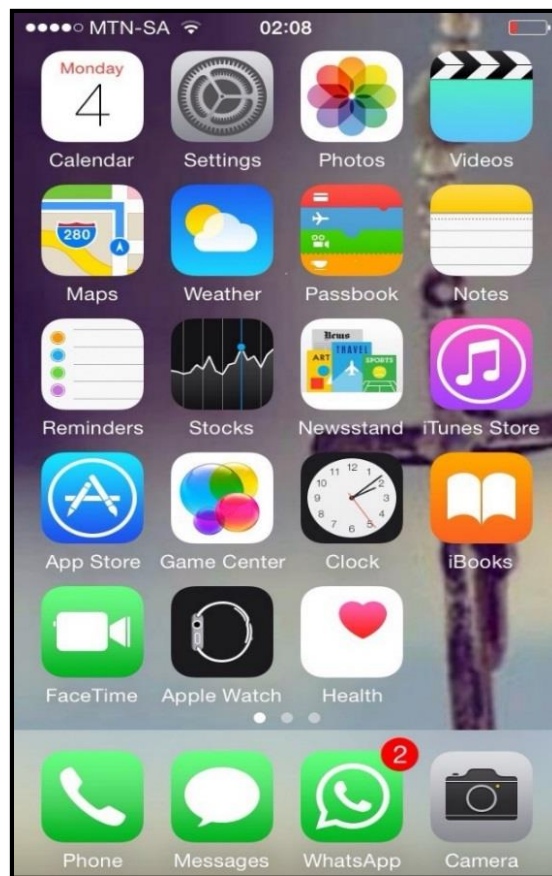
Figure 3.4: iPhone user has customized the home screen according to preference. i.e. personal background, specific icons on home page

- Constraints

  The principle of constraints is crucial and focuses on constraining user choices, in this way less errors are possible and it ensures easy usability (Norman, 2002). According to Rogers *et al.* (2011:21) the principle of constraining is concerned with determining ways to restrict the user interaction that can take place at a certain instant. The concept of constraining is advantageous as it prevents the user from selecting incorrect options which in turn decreases the probabilities of creating unnecessary mistakes. For

example, when certain menu options are disabled it restricts the functions that are only permissible at the certain phase of the task. Figure 3.5 illustrates a menu with restricted availability of menu options.
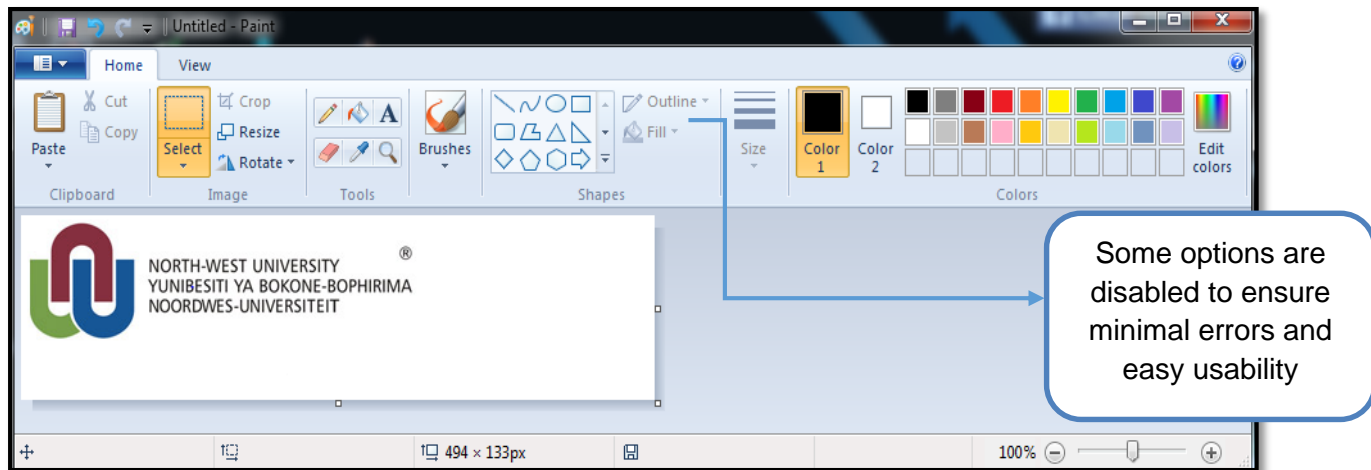
Figure 3.5: A painting program showing disabled options

- Dialog initiative

  The principle of dialog initiative considers the user interaction with the system and it is important to distinguish between the user and system as to which one has the initiative between the two (Dix *et al.*, 2004:266). In many cases, the system initiates the dialog and the user is expected to simply respond to the information requested. By incorporating the dialog initiative principle in a system which is known as system pre-emptive dialog, numerous errors from user can be reduced. Figure 3.6 and Figure 3.7 depicts the system pre-emptive dialog principle where the system controls the dialog and prohibts the user from freely initiating desired interation with the system.

Figure 3.6: System pre-emptive dialog where user is restricted to simply choosing limited options
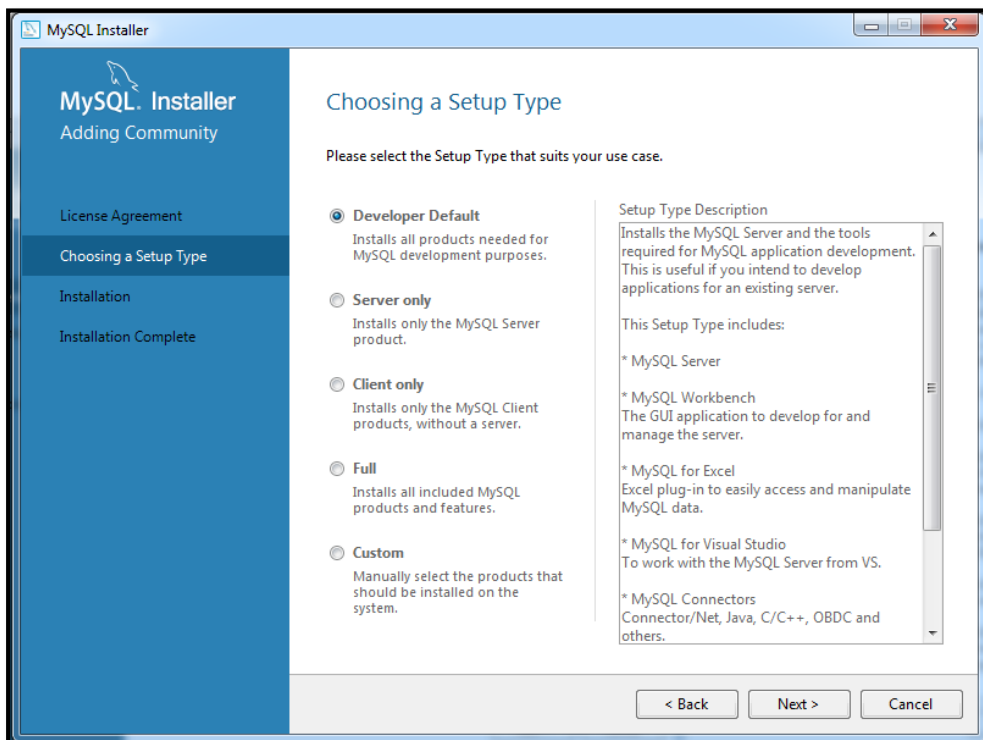
Figure 3.7: System pre-emptive dialog where system initiates the dialog and the user is expected to simply respond to the information requested

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- Feedback

  The principle of feedback highlights the importance of showing the outcome of an action. Feedback is focused on returning information regarding what action has been done and what has been accomplished therefore allowing user to proceed with the task at hand (Norman, 2002). According to Rogers *et al.* (2011:21) without the use of feedback, the user is always uncertain whether an activity has been successfully accomplished or not. The correct use of feedback can also enhance the visibility necessary for user interaction.

Figure 3.8: Yahoo sign up illustrating the principle of feedback (https://edit.europe.yahoo.com/registration?)

3.5 HCI principles efficient for interactive guide design

For the purpose of this study, the principles identified and selected for the effective design of an interactive guide design are the principles of consistency, visibility and feedback.

The principle of consistency focuses on the features of an interface that create a familiar impression throughout an application for the user. Consistency eliminates the possibilities of the user not knowing how to navigate through the application.

In Figure 3.9 and Figure 3.10, the principle of consistency is displayed on the learning edge application since the main layout design remains constant and what differentiates the different interfaces is the courses selected.

Figure 3.9: Learning edge website: Database Courses illustrating the principle of consistency (http://www.leadingtraining.co.za/databases_courses)

Figure 3.10: Learning edge website: Human Resources Courses interface illustrating the principle of consistency (http://www.leadingtraining.co.za/hr_courses)

As discussed in Section 3.4.1, the principle of visibility focuses on making functional buttons visible for the user. Visibility is essential as it avoids creating unnecessary confusion for the user. In Figure 3.11, the principle of visibility can be illustrated by using the NWU eFundi home page as the login button is clearly visible for the user.

The 'Log in' button is clearly visible and function can be easily understood
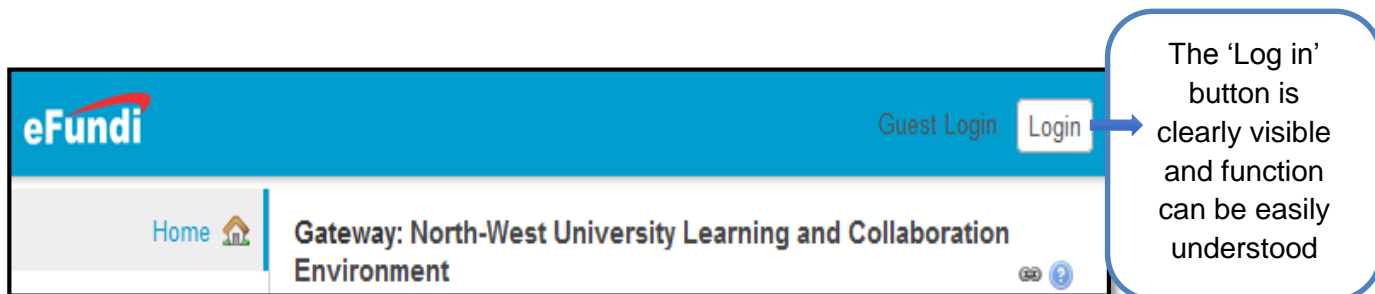
Figure 3.11: eFundi login interface illustrating the principle of visibility (http://efundi.nwu.ac.za/portal/)

The principle of feedback focuses on displaying the outcome of an action. Feedback is concerned with returning information to the user. In Figure 3.12, the principle of feedback is illustrated as a feedback message is displayed when a button is selected and detailed information is provided for the user.

A feedback message is displayed when a button is selected providing detailed information
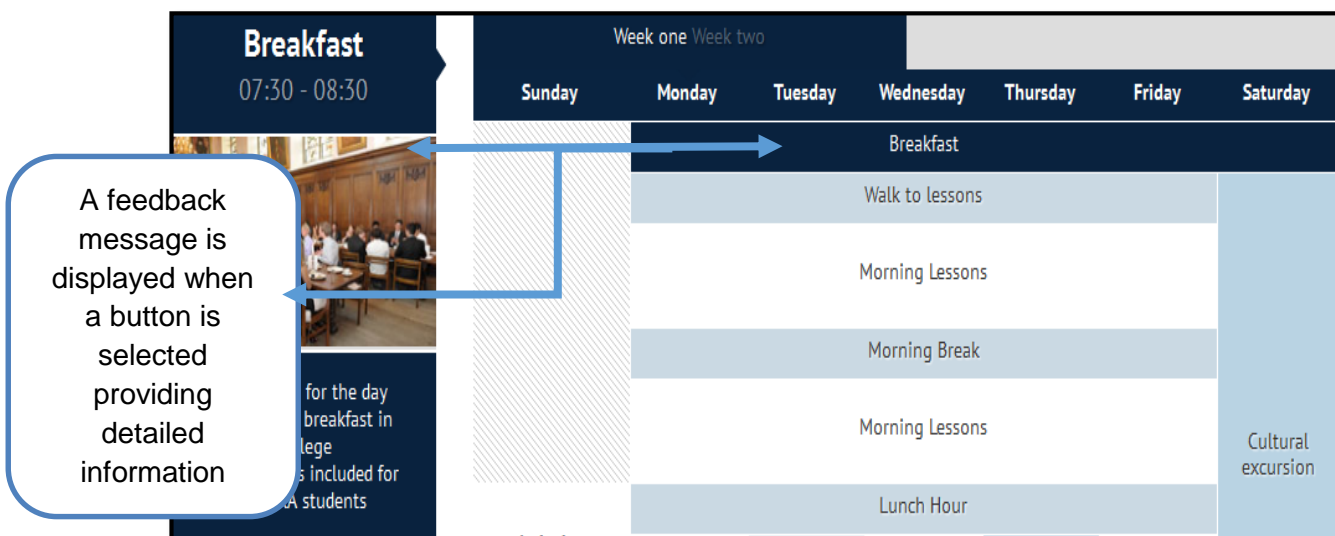
Figure 3.12: Timetable illustrating the principle of feedback (https://www.oxford-royale.co.uk/students/interactive-timetables)

3.6 Summary

The objective of this chapter was to gain understanding of HCI, HCI principles and interactive designs based on existing literature. The objective was met by discussing the following concepts:

- The existing tools currently used for interactive guides
- Interactive applications in-depth
- General application of HCI principles and HCI principles that could be used specifically for an interactive guide design.

The chapter focused on illustrating the potential impact of HCI principles in the design and development of an interactive guide application.

The next chapter addresses the second part of the suggestion phase of this study's methodology which includes the data gathering technique used as well as analysis of the obtained data.

Chapter 4: Data analysis

4.1. Introduction

The goal of this study is to identify which HCI principles to apply in the design of an interactive guide for a university orientation program. In order to successfully achieve this, design science research was identified as the appropriate methodology as described in Chapter 2. This chapter presents the second part of the suggestion phase of this study's methodology.

During the suggestion phase, interviews were conducted as part of the requirements analysis for the interactive guide. The purpose of the requirements analysis is to obtain insight and suggestions regarding the design of the interactive guide.

This chapter is divided into the following sections: provides the introduction (Section 4.1), elaborates on the participants and interview questions (Section 4.2), and provides feedback obtained from the interview (Section 4.3), analysis of the data obtained (Section 4.4) and a conclusion (Section 4.5).

4.2. Participants and the interview questions

Participants help the researcher collect data about a specific research topic. The appropriate participants for this study are employees that work at the student affairs department of the North-West University. The feedback from these participants will be valuable to the study because they have expertise in dealing with first year students and with the development of the traditionally used orientation programme.

For the purpose of this study, it was necessary to select three participants for the interviews as the saturation of information required within the scope of this study was achieved. It is not necessary to conduct more interviews due to the limited nature of the study.

Table 4.1 below depicts interview questions found in literature and that will be used for data gathering. The different literature sources from which the interview questions were found have been proven to work successfully which is why using these questions is best suited.

Table 4.1: Interview questions from sources

Number	Question
1	Name the three things that are most important in the design of your new website. (deGeyter, 2014)
2	What features do you think your website should include?(Way, 2009)
3	What visual elements are needed within the new website? (Anon, 2013)

| 4 | Are there colour preferences for the new website? (Anon, 2013) |
| 5 | How do you want the design to influence your customers?(Gaines, 2013) |

The questions were adopted for the purpose of the study as depicted in Table 4.2 below.

Table 4.2: Adopted questions for this study

Number	Questions from source	Questions adopted for this study
1	Name the three things that are most important in the design of your new website(deGeyter, 2014)	Mention the three things that are most important in the design of an interactive guide used for first year orientation week.
2	What features do you think your website should include?(Way, 2009)	In your opinion, what features do you think the interactive guide should include?
3	What visual elements are needed within the new website? (Anon, 2013)	What visual elements would you prefer within the interactive guide?
4	Are there colour preferences for the new website? (Anon, 2013)	Are there any colour preferences you would suggest for the interactive guide?
5	How do you want the design to influence your customers?(Gaines, 2013)	How would you like the design of the interactive guide to influence the first year students?

4.3. Feedback obtained from the interview

During the conduction of interviews, the feedback from selected participants was documented and is presented in Table 4.3 on the next page.

Table 4.3: Feedback obtained from the interviews

Question number	Question adopted for this study	Participant 1	Participant 2	Participant 3
1	Mention the three things that are most important in the design of an interactive guide used for first year orientation week.	• Academic preparation. • Help know the campus (direction around campus). • Provide tips or advice. Helping students adjust to university life.	• Should be a guiding tool for students to know what to attend and where. • Provide introduction to student life. • Tool to help students to make choices regarding extra-curricular.	• Introduce them to different programmes provided on campus. • Expose them to in methods of teaching and lecturing. • Consider how to integrate them in the university environment.
2	In your opinion, what features do you think the interactive guide should include?	• Be able to receive detailed information about an event. • Students should be able to evaluate the orientation programme for efficiency (comment box).	• Should include frequently asked questions. • Provide advice to students. • Compose of a help component of how to operate interactive guide.	• Should include guiding features that will help students around campus.
3	What visual elements would you prefer within the interactive guide?	Should be appealing and visual, no clustered information.	• Funky look, not too rigid. • Should resemble the first year student.	• Should appeal to the 'born free' generation. • Must be user-friendly.

4	Are there any colour preferences you would suggest for the interactive guide?	• Bright and vibrant colours. • Examples; greens, pinks, yellows. • Texts in colour should be visible.	• Official NWU colours.	• Use striking colours • Examples; red, green, pink, purple.
5	How would you like the design of the interactive guide to influence the first year students?	• To improve the attendance of first year students. • Should instil excitement as well as knowledge in the student.	• To become a toolkit to first year students about simple, knowledgeable things. • Should give the first year insight beyond the orientation week.	• To develop them to be independent thinkers.

4.4 Analysis of data obtained from the interview

To analyse the responses received, open coding will be used. Strauss and Corbin (1990: 62) describe open coding as a procedure which entails the breaking down of the data into discrete parts, closely examining and comparing the data for similarities and difference. Open coding is therefore a process of interpretation with the purpose of discovering concepts based on the data.

The responses for the three most important things in the design of the interactive guide are recorded in Table 4.4. From these responses, we gather that the guide should mostly serve as a tool to help the first year students adjust to university life. It should also provide guidance for about the structure of the campus as well as inform first year students about extra-curricular programmes provided and academic preparation.

Table 4.4: Feedback from question 1

Mention the three things that are most important in the design of an interactive guide used for first year orientation week.	
Code assigned	**Example answers**
Help adjust to university life (3 occurrences)	"Provide tips or advice. Helping students adjust to university life."
	"Consider how to integrate them in the university environment."
Guiding tool (2 occurrences)	"Help know the campus(direction around campus)"
	"Should be a guiding tool for students to know what to attend and where."
Introduce extra-curricular programmes provided (2 occurrences)	"Introduce them to different programmes provided on campus."
	"Tool to help students to make choices regarding extra-curricular"
Academic preparation (2 occurrences)	"Provide academic preparation."
	"Expose them to in methods of teaching and lecturing. "

Table 4.5 displays the responses received for what features the interactive guide should include. From the responses, we can gather that features such as frequently asked questions and evaluation of orientation programme should be included.

Table 4.5: Feedback from question 2

In your opinion, what features do you think the interactive guide should include?	
Code assigned	**Example answers**
Frequently asked questions (1 occurrence)	"Should include frequently asked questions."
Evaluation (1 occurrence)	"Students should be able to evaluate the orientation programme for efficiency (comment box)."

In Table 4.6, the responses to which visual elements are preferred for the interactive guide are recorded. We gather that the interactive guide ought to be appealing to the eye and should relate to the first year student.

Table 4.6: Feedback from question 3

What visual elements would you prefer within the interactive guide?	
Code assigned	**Example answers**
Appealing (2 occurrences)	"Should be appealing and visual, no clustered information."
	"Should appeal to the 'born free' generation."
Should relate to the first year student interests (2 occurrences)	"Should resemble the first year student."
	"Should appeal to the 'born free' generation."

The colour preference responses for the interactive guide are recorded in Table 4.7. From these responses, we can gather that the interactive guide should incorporate the official NWU colours as well as utilize bright, vibrant, funky colours.

Table 4.7: Feedback from question 4

Are there any colour preferences you would suggest for the interactive guide?	
Code assigned	**Example answers**
Bright, vibrant, funky colours (2 occurrences)	"Bright and vibrant colours"
	"Use striking colours"
NWU colours (1 occurrences)	"Official NWU colours"

Table 4.8 depicts the responses received on how the interactive guide design should influence the first year students. From the responses, we can gather that the design of the interactive guide should influence the first year student in such a way that it instils excitement and knowledge. It should also improve the overall attendance of the first year students.

Table 4.8: Feedback from question 5

How would you like the design of the interactive guide to influence the first year students?	
Code assigned	**Example answers**
Instil excitement and knowledge (2 occurrences)	"Should instil excitement as well as knowledge in the student."
	"To become a toolkit to first year students about simple, knowledgeable things."
Improve attendance (1 occurrences)	"To improve the attendance of first year students."

4.5 Conclusion

After the analysis of the feedback obtained from the interviews conducted, important aspects regarding the design of the interactive guide were discovered and depicted in Table 4.9.

Table 4.9: Important things gathered from data analysis

The most important things gathered regarding the design of the interactive guide	
1	Guide should be informative and instil knowledge
2	Assist first year student in adapting to university
3	Should appeal to the first year student
4	Become a toolkit for the first year student
5	Should utilise bright, vibrant colours as well as the official NWU colours

We can conclude that the interactive orientation guide is not only necessary for the first year orientation week, it is also necessary to assist the first year student to go through a smooth transition from high school to university. It should serve beyond the orientation programme and give guidance to important issues that are not be addressed during orientation week.

The next chapter demonstrates the design and development of the artefact using the HCI principles identified and the data gathered.

Chapter 5: The artefact design

5.1 Introduction

The goal of this study is to identify which HCI principles to apply in the design of an interactive guide for a university orientation program. In order to achieve this, the design science research methodology as described in Chapter 2 was applied. This chapter illustrates the development phase of this study's DSR methodology. The objective of this chapter is to demonstrate the design and development of the artefact which addresses the main objective of this study.

This chapter is divided into the following sections: summary of principles and feedback (Section 5.2), artefact design (Section 5.3) and finally, the conclusion (Section 5.4).

5.2 Summary of principles and feedback

In order to develop an artefact that satisfies the requirements gathered as well as the HCI principles identified, it was important to interlink the two. Table 5.1 below explains how the HCI principles and the feedback obtained are linked for the purpose of this study.

Table 5.1: Explanation of HCI principles and feedback

HCI principles	Feedback from interviews	Explanation
Consistency	Should utilise bright, vibrant colours as well as the official NWU colours.	By utilising bright colours as well as the official NWU colours, the principle of consistency was achieved as the use of the colours created an impression of resemblance throughout the artefact.
	Should appeal to the first year student.	Designing the artefact in such a way that it creates an impression of resemblance, the first year student will find the artefact appealing and easy to work with.
Feedback	Guide should be informative and instil knowledge.	Providing detailed information to the first year student creates an informative artefact that provides feedback to the user.

	Assist first year in adapting to university.	Feedback is concerned with providing information. The artefact will therefore assist first year in adapting to university as additional information is provided to the first year.
Visibility	Become a toolkit for the first year student.	The contents and components of the artefact are made visible for the first year student, in doing so the artefact will be viewed as a toolkit.

5.3 Artefact design

The artefact design incorporates the HCI principles identified and the feedback obtained during requirements gathering is illustrated in the screenshots on the next three pages.

The official NWU colours as well as bright colours were used in the design of the artefact in order to create an appearance that is consistent and is appealing to the first year student. Figure 5.1 and Figure 5.2 show how the different colours were integrated into the design of the artefact. The main layout of the artefact uses the official NWU colours to create an impression of resemblance throughout the artefact. The bright, vibrant colours are used to differentiate the different courses, so that the first year student can easily find the details of the activities related to his or her course. The use of the different colours in the different components of the artefact create an appealing look for the first year student.

Figure 5.2: Home page illustrating the principle of consistency integrated with university official colours
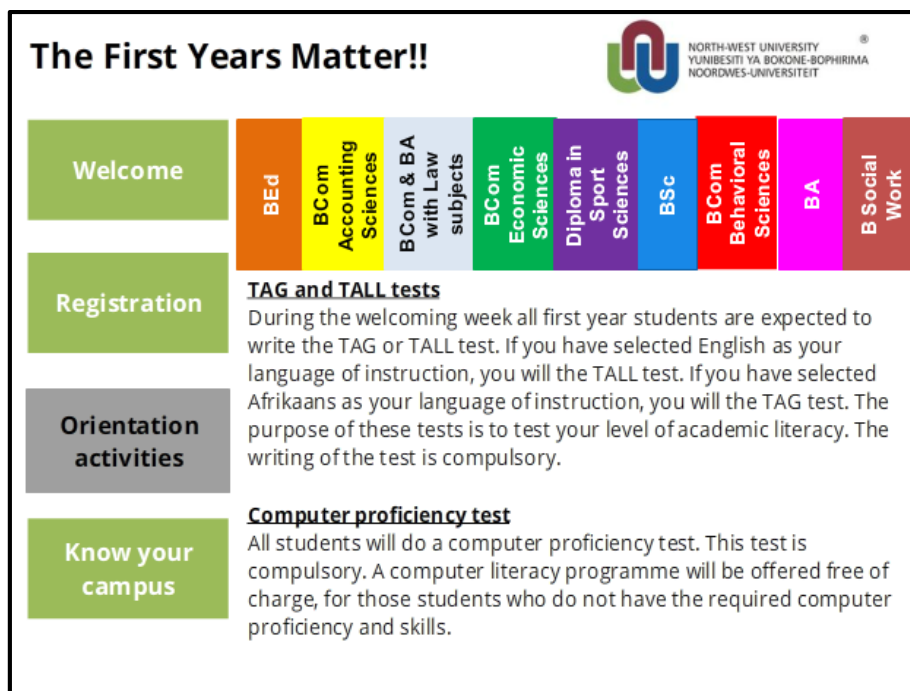
Figure 5.3: Orientation activities page illustrating the principle of consistency integrated with bright, vibrant colours

Figure 5.3 and Figure 5.4 depict the different ways in which the feedback principle was applied. With the feedback principle applied, the artefact instils knowledge and provides additional information to the first year student. Additional information is provided about the different groups that exists in the BSc course. The first year gains knowledge of what differentiates the two groups and therefore will be informed as to which group they belong. Detailed information is also provided by the registration calendar in order to inform the first year student when to register for a specific course.

Figure 5.4: Orientation activities page illustrating the principle of feedback

Figure 5.5: Registration page illustrating the principle of feedback

The principle of visibility is essential to an artefact design as it prevents unnecessary confusion for the user. Figure 5.5 and Figure 5.6 illustrate visibility of the artefact components as the tabs are descriptively named and the first year student would know how to navigate through the artefact. With visibility in place, the artefact can successfully act as a toolkit as it composes of information and the user knows where to go for what information.

Figure 5.6: Welcome page illustrating the principle of visibility

Figure 5.7: Registration page illustrating the principle of visibility

5.4 Conclusion

The objective of this chapter was achieved through the actual development of the artefact. The artefact demonstrated in this chapter illustrates how appropriate selection of HCI principles can be integrated with the gathered data from interviews for the successful design of an artefact. However, the main difficulty faced during the design and development of the artefact was properly linking the selected HCI principles to the gathered data.

The next chapter concludes and summarises this study.

Chapter 6: Conclusion

6.1 Introduction

The goal of this study was to identify which HCI principles to apply in the design of an interactive guide for a university orientation program.

This chapter is divided into the following sections: summary of study (Section 6.2), limitations and future research (Section 6.3) and finally, the conclusion (Section 6.4).

6.2 Summary of study

The research study consisted of 6 chapters and what was encountered in each chapter is the following:

Chapter 1- In this chapter, it was identified that the use of the traditionally used paper-based orientation program is insufficient as students either misplace the programme or do not understand the programme or do not understand it or in most cases find the programme uninteresting to go through. Taking into account that the youth of today is technology centric, the design of an interactive guide using HCI principles can help address the problem identified. The theoretical concepts of the study were HCI and HCI principles, interactive guides and design science research. In order to aid the direction of the research study, a primary objective was defined which was to identify which HCI principles to apply in the design of an interactive guide for a university orientation program.

Chapter 2- In order to have successfully achieved the defined primary goal of the study, a selection of a methodology was significant. In this chapter, the main focus was the design science methodology as it was the appropriate methodology for this study. Design science research was selected as the appropriate methodology because the objective of this study was to design an innovative interactive guide.

Chapter 3-In this chapter, existing literature on the key concepts of the study was discussed. Appropriate HCI principles were selected for the effective design of the proposed artefact. This chapter focused on illustrating the potential impact of HCI principles in the design and development of an interactive guide.

Chapter 4-For this chapter, interviews were conducted as part of the requirements gathering for the interactive guide. The purpose of the interviews was to obtain insight and suggestions regarding the design of the interactive guide. The participants of the interviews were the employees that work at the student affairs department of the North-West University. They were a suitable selection because they work closely with the development of the traditionally used orientation program. Only three participants for the interviews were selected as the saturation

of information required within the scope of the study was achieved. The feedback obtained from the interviews was analysed by using open coding by Straus & Corbin (1990). The results from the data analysis were used to obtain insight and important aspects regarding the artefact design.

Chapter 5- This chapter illustrated the development phase of the interactive guide artefact. The artefact was developed based on the integration of the selected HCI principles and feedback obtained. The main difficulty faced during the development of the artefact was accurately linking the selected HCI principles to the gathered data from interviews.

Chapter 6-In this chapter, the study was concluded by reflecting on the events that occurred in each research chapter, limitations and future research of the study.

6.3 Limitations and future research
Due to the limited nature of an honours research study, the following aspects of the study fell short:

- Only three HCI principles were selected for the design of the artefact whereas if the research study had a broader scope, more HCI principles would've been chosen which would've enhanced the effective design of the proposed artefact.
- Only three participants were interviewed which limited the amount of feedback obtained. Had the study been of a bigger scope, further richer information would've been obtained and more insight regarding the design would've been taken into consideration.
- Interviews were only conducted for data gathering and more feedback could've been obtained through user testing. Conducting interviews after the development of the artefact could've determined if the artefact is satisfactory to the user.
- A subset of the artefact was created. Better results would've been obtained with the development of a full blown artefact.

6.4 Conclusion
The research problem that was identified for this study was that the use of the traditionally used paper-based orientation program caused insufficient communication between officials and first year students regarding orientation activities. Taking into consideration that first year orientation programmes are significant in the assistance of successful transition for first year students, a suggestion to the identified problem was a necessity. The suggestion was to design an interactive guide for a university orientation program since the modern first year students are technology centric and could easily relate to the guide.

The goal of this study was to identify which HCI principles to apply in the design of an interactive guide for orientation week. The theoretical concepts defined for this study were HCI and HCI principles, interactive guides and design science research. The research methodology selected for this study was design science research as the objective of this study was to design an innovative interactive guide. By conducting a literature review, HCI principles that were best suited for the interactive guide design were selected. Interviews were conducted in order to gather user requirements and suggestions regarding the design of the interactive guide. The feedback obtained from the interviews was analysed by using open coding by Straus & Corbin (1990). The artefact was developed based on the integration of the selected HCI principles and feedback obtained.

The research proved that the appropriate selection of HCI principles can help enhance the interaction between the computer and the user. The type of interview questions were proven to be fundamental during requirements gathering as they determine the level of detailed obtained in the feedback. The main difficulty faced during the development of the artefact was accurately linking the selected HCI principles to the gathered data from interviews.

It can be concluded that the goal of the research study was achieved even though the research was limited due to it being an honours study. The research problem was also addressed by means of eliminating the insufficient communication between officials and first year students through the design of the interactive guide. However, due to the limited nature of the research study the interactive guide design was restricted and could've served beyond the orientation programme and give guidance to important issues that are not be addressed during orientation week.

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Appendix A: Ethics Letters

Notice to all participants

Student <u>Mampho Lechumo (236009142)</u> is currently busy with an honours project where research methods are practiced. He/she identified you as a possible participant in his/her study. Please note the following:

1. The student should advise you on the purpose of the study/ research question.
2. Your participation is voluntary.
3. The student is not conducting research on behalf of the NWU – only gathering data for an assignment.
4. All data will be destroyed after completion of the assignment.
5. Your name will not be published.
6. The student / supervisor may publish his/her findings at a conference.
7. You may at any time ask that your contribution is removed from the study.

Please sign below to indicate that you are aware of the items listed above.

Participant:

Date: 2015/08/04

Thanks for your participation:

Prof Roelien Goede

Module Coordinator: ITRI671

Notice to all participants

Student ___Mampho Keclimo(2360094)__ is currently busy with an honours project where research methods are practiced. He/she identified you as a possible participant in his/her study. Please note the following:

1. The student should advise you on the purpose of the study/ research question.
2. Your participation is voluntary.
3. The student is not conducting research on behalf of the NWU – only gathering data for an assignment.
4. All data will be destroyed after completion of the assignment.
5. Your name will not be published.
6. The student / supervisor may publish his/her findings at a conference.
7. You may at any time ask that your contribution is removed from the study.

Please sign below to indicate that you are aware of the items listed above.

Participant:

Date:

4/8/2015

Thanks for your participation:

Prof Roelien Goede

Module Coordinator: ITRI671

Notice to all participants

Student ___Mampho Leчumo (2360094)___ is currently busy with an honours project where research methods are practiced. He/she identified you as a possible participant in his/her study. Please note the following:

1. The student should advise you on the purpose of the study/ research question.
2. Your participation is voluntary.
3. The student is not conducting research on behalf of the NWU – only gathering data for an assignment.
4. All data will be destroyed after completion of the assignment.
5. Your name will not be published.
6. The student / supervisor may publish his/her findings at a conference.
7. You may at any time ask that your contribution is removed from the study.

Please sign below to indicate that you are aware of the items listed above.

Participant:

Kum Coopoo

Date:

_31|7|2015_

Thanks for your participation:

Prof Roelien Goede

Module Coordinator: ITRI671